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European Wind Atlas

COMMISSION OF THE EUROPEAN
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EUROPEAN WIND ATLAS

Ib Troen and Erik Lundtang Petersen

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European Wind Atlas

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Foreword

The European Wind Atlas is a major outcome of the European Communities' overall effort to promote the market for electricity production from the wind resource in Europe and to develop the technologies and systems associated with it.

This Atlas completes the information previously published in several national wind atlases, and it will doubtless become an essential tool for all planners of wind energy applications in the Community. The data in this new European Atlas are far more comprehensive than those given in previous works. Moreover, this Atlas provides for the first time a coherent overview of all the EC countries, including the large regions with complex terrain. The latter was a major achievement because reliable computer codes had to be developed especially for this task.

The production of this Atlas is an outstanding example of European cooperation in science and technology, which is currently being stimulated by the Commission of the European Communities in Brussels. The work on the Atlas was first commissioned by the European Community in 1981. A European network of competent meteorological and other institutions was set up for the task. The Commission entrusted Risø National Laboratory in Denmark with project coordination, in view of their prior experience in producing the Danish wind atlas. The Commission also provided the main funding. Thanks to many years of intense effort by several leading European experts and institutes in the field, it has been possible to bring the project to a most satisfactory conclusion.

I trust that all those interested in the future development of wind energy utilization in Europe will appreciate this vast work and benefit from the comprehensive information it provides in their future activities.

Dr. W. Palz
Division Head for
Development of Renewable Energies
Commission of the European Communities
Brussels, Belgium

Executive summary

Areas potentially suitable for wind energy applications are dispersed throughout all the countries of the European Communities. Major areas that have a high wind energy resource include: Great Britain and Ireland, the northwestern continental parts of the EC: Denmark, northern Germany, the Netherlands, Belgium and northwestern France. Other areas are northwestern Spain and a majority of the Greek islands. In addition, there are many areas, in particular in the Mediterranean countries, where wind systems associated with mountain barriers give rise to high energy potentials. Some of these wind systems extend over large areas: the Mistral between the Alps and the Massif Central in the south of France, the Tramontana north of the Pyrenées in France and south of the Pyrenées in the Ebro valley. In other cases such wind systems are of smaller geographical extent but may nevertheless give a large wind resource locally. Of particular interest in mountain valleys and passes are sites where natural concentration effects of the wind occur.

The information collected and presented in the Wind Atlas clearly identifies and documents the existence of large regions with good promise for widespread exploitation of the wind resource. Furthermore, the methods developed for the Atlas for calculating the influence of topography on the wind speed have documented the strong enhancement of the wind energy potential that can be found in complex terrain. The methods for the calculation of topographic effects have been made available to the public prior to the publication of the Wind Atlas in the form of a programme for use on personal computers. This programme, together with the Wind Atlas, constitutes a foundation for the calculation of wind energy potentials - including the siting of wind turbines - in the European Communities.

The Wind Atlas provides a reliable picture of the overall and general distribution of the wind resources in Europe. In regions of the Netherlands, northern Germany and Denmark, the relatively uncomplicated topographical conditions enable the user to perform reliable siting calculations by straightforward use of the Wind Atlas. In complicated topography well covered by the Wind Atlas, such as in Central France, experience with the use of the Atlas for complex terrain and a knowledge of local conditions is necessary to obtain dependable estimates of wind potentials. In areas with complicated topography and for which only sparse statistics exist in the Atlas, as for the mainland of Greece, the Wind Atlas can aid in the identification of regions which might have a high potential but for which additional information is required.

The European Wind Atlas is the first attempt to provide comprehensive guidelines and statistics for the calculation of the wind energy resources of the European Community countries. It constitutes the base for the continuing effort of the Commission to provide the countries of the European Community with a reliable source of information and computational procedures for assessing the European wind energy resources.

Contents of the Wind Atlas

The Atlas is divided into three parts, each intended for readers with different areas of interest – from laymen to professional meteorologists.

Part I: The Wind Resource provides an overall view of the wind climate and magnitude and distribution of wind resources in the European Community countries. This part of the Atlas is intended to be useful to politicians, planners and laymen in general. The descriptions, tables and maps permit a first, rapid identification of regions with favourable wind resources.

Part II: Determining the Wind Resource gives explanations and information needed for the purpose of regional wind resource assessments and the local siting of wind turbines. It contains the raw statistics for 220 meteorological stations and the regional climatological statistics derived from the station data. It also includes methods for calculating the influence on the wind resource of various features in the landscape such as coastlines, forests, hills, and buildings. Examples are given to show the combined application of the methods and the regional climatological statistics. For a full appreciation of this part a certain knowledge of mathematics and statistics is necessary. At the stage of concrete applications such as the siting of a particular wind turbine at an actual location, it is more the rule than the exception to encounter conditions so complicated that calculation of the wind resource can be performed only by means of a computer. To facilitate such resource calculations on computers, the diskette placed at the back of the Atlas contains all the necessary statistical input. Throughout Part II examples are given both for relatively uncomplicated conditions where the methods and statistical tables can be used directly and for conditions where the calculations have been performed on a personal computer. These examples are produced with a programme specially developed for the production of the Wind Atlas. Details of this *Wind Atlas Analysis and Application Programme* (WA^{S}P) can be found in Part III.

Part III: The Models and the Analysis is the documentation part of the Atlas. This part requires some meteorological and statistical knowledge of the reader. It describes how the analysis was performed from the data and the information gathered by each participating country to the resulting regional climatological statistics. Chapter 8 discusses the physical and statistical basis for the Wind Atlas model. It includes the geostrophic drag law and surface-layer similarity theory, a theory for flow modification due to changing surface characteristics, a model for far-field influence of sheltering obstacles, and finally a model for flow in hilly terrain. The statistical basis rests on the assumption of the applicability of the Weibull distribution function to wind data. Hence this chapter describes the Weibull function and the fitting procedures used. In Chapter 9 the validity of the models and the analysis is demonstrated through a number of comparisons between measured and modelled wind statistics.

Contents

Preface and acknowledgements

The European Wind Atlas is the result of an investigation of the climatic wind conditions in the European Community countries.

The investigation was conducted from 1981 to the date of publication by the community countries under the sponsorship of the Commission of the European Communities. The Wind Atlas is part of the wind energy research and development programme directed by W. Palz of the Commission.

The Atlas is an attempt to present wind-climatological data for the EC countries in a consistent and coherent manner and to provide a methodology for their use in wind resource assessment. It is foreseen by the Commission that the Atlas later may be supplemented with more data sets and extended to other countries.

Risø National Laboratory, Denmark, has had the overall responsibility for project coordination and theoretical work, numerical modelling, data analysis, and reporting. The main responsibility of the participating countries was to provide the best possible meteorological data and descriptions of the meteorological stations in addition to constructive reviews and criticism of the work performed and results produced.

At the time of publication the working group had the following members:

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Koninklijk Nederlands
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De Bilt, The Netherlands

The study has also benefited from the involvement of the following persons who have either participated actively in the working group for a period of time or contributed during one or more of the group meetings:

Belgium:	L. Malet
Denmark:	N.O. Jensen, S.E. Larsen and N.G. Mortensen
France:	C. Sacré
Germany (FRG):	H. Schmidt and W. Thommes
Italy:	G.A. Dalu and A.M. Sempreviva
The Netherlands:	A.P. van Ulden
United Kingdom:	B. Shearman and R.J. Adams

Part of the statistics shown for Italy is brought with the permission of Ente Nazionale per l'Energia Eletrica. We acknowledge the cooperation with G. Botta of this institution. A. Restivo, University of Porto, supplied data from the Ferrel mast in Portugal; B. Tammelin, Finnish Meteorological Institute, supplied data from the Kivenlahti mast in Finland; G. Tunell, Swedish State Power Board, and R. Krieg, Swedish Meteorological and Hydrological Institute, supplied data from the Näsudden mast in Sweden; K. Hedegård, Danish Meteorological Institute, supplied information on the Danish stations; J.A. Børresen, Norwegian Meteorological Institute, supplied data and information on the geostrophic wind over the North Sea, and R. Smith, Yale University, USA, was consulted at the beginning of the project on the effect of mountains on the wind. The base maps and information on the relative relief of Europe have been reproduced with the permission of Esselte Map Service, Sweden. All these contributions are gratefully acknowledged.

Many of our colleagues in the Department of Meteorology and Wind Energy at Risø National Laboratory contributed helpful, constructive criticism and suggestions. We should especially like to thank Niels Otto Jensen and Niels Gylling Mortensen. Two of the fundamental models used in calculating the Wind Atlas (the change-of-terrain roughness model and the flow-over-hill model) could not have been built without the active involvement of Niels Otto Jensen.

The final calculations and presentation of the results as well as the writing and editing of the Atlas have benefited significantly from the dedication and skill of Niels Gylling Mortensen.

In the final stage of writing the manuscript, L. Crossby provided valuable linguistic and editing assistance.

A special thank is addressed to the many colleagues in various departments at Risø who have been exceedingly helpful with many practical tasks such as photographical work, computer assistance, drawing of maps, typing, photocopying, and many other things.

It is with great pleasure that we acknowledge the excellent cooperation with W. Palz of the Commission whose continuing support on both scientific and administrative matters and never-failing interest have been invaluable.

We also wish to express our appreciation of the good cooperation we have had with W. Schnell, E. Van der Voort and G. Caratti of the Commission and B. Rasmussen, consultant to the Commission. It was with deep regret that in November 1985 we received the sad message of the untimely death of Werner Schnell. His enthusiastic interest in the Wind Atlas project was a great help and we miss him.

It is our hope that this publication containing statistics of the wind climate for all regions of the EC, based on carefully selected and analysed data sets and models developed on the basis of the best contemporary theories, will fulfil a valuable function by providing an authoritative although inevitably incomplete basis for calculating the wind resources in the EC. Indeed, the objective of achieving such a much-needed publication was borne in mind by the Commission and the Wind Atlas working group during the seven years of the study. We are indebted to the Commission for having kept faith in the project over many years and for having provided the necessary funding.

We further acknowledge the excellent and inspiring cooperation with our colleagues and friends in the working group.

Several models used in the analysis were developed especially for this study. The methodology based on the geostrophic drag law and surface-layer similarity have never before been applied to a large and topographically inhomogeneous region. Therefore, at times during the study we have ventured into unknown territory, sometimes with failing confidence that the study would ever lead to acceptable results or whether the many complications would render this impossible and force us to revert to simple traditional methods of data analysis. After our long silent periods, the working group was always ready for consultations and advice, and for this they deserve much credit.

The experience we have gained through the study indicates that the derived climatological statistics work satisfactorily for most practical purposes and often much better than anticipated. We are confident that the European Wind Atlas will prove a useful source of information. It has certainly been a pleasure, a privilege and an education to participate in its production.

Risø National Laboratory, Denmark *Ib Troen and Erik Lundtang Petersen*

Chapter 1

Introduction to the Wind Atlas

The aim of the European Wind Atlas is to establish the meteorological basis for the assessment of wind energy resources. The main objective is to provide suitable data for evaluating the potential wind power output from large electricity producing wind-turbine installations. In addition, the Wind Atlas provides data and guidelines for the meteorological aspects of the detailed siting of large and small wind turbines.

An important characteristic of wind energy is that the power output of a wind turbine is proportional to the third power of the wind speed. Therefore the precision requirements of wind speed statistics for energy assessments are higher than for most other purposes.

Another noteworthy characteristic of the wind is the seasonal and year-to-year variations of the wind conditions. An accurate determination of wind climatologies must take account of these variations, therefore several years of wind data must be used in the analysis.

Hence, the application of wind measurements to wind power calculations demands long time series of high-quality wind data. The study leading to the Atlas has been fortunate in having the possibility of selecting high-quality data sets from good measurements made at airports, synoptic and climatological stations and lightships all over Europe.

The wind speed measured at a meteorological station is determined mainly by two factors: the overall weather systems, which usually have an extent of several hundred kilometres, and the nearby topography out to a few tens of kilometres from the station. Strictly speaking, the direct use of measured wind speed data for wind resource calculations results in power estimates that are representative only for the actual position of the wind-measuring instruments. The application of measured wind speed statistics to wind energy resource calculations in a region therefore requires methods for the transformation of wind speed statistics. In the Wind Atlas study a great effort has gone into the development of such methods, resulting in a comprehensive set of models for the horizontal and vertical extrapolation of meteorological data and the estimation of wind resources. The models are based on the physical principles of flows in the atmospheric boundary layer and they take into account the effect of different surface conditions, sheltering effects due to buildings and other obstacles, and the modification of the wind imposed by the specific variations of the height of ground around the meteorological station in question. Figure 1.1 illustrates the use of the models on measured wind data to calculate a regional wind climatology. The figure also illustrates the application of the Wind Atlas, following a procedure in which the regional wind climatologies are used as input to the models to produce site-specific wind climatologies. The models are described in detail in Chapter 8.

More than two hundred meteorological stations in the European Community countries were selected for the calculation of regional wind climatologies. The results from 208 of these stations are presented in Chapter 7: *Station statistics and climatologies.* The stations are shown on the wind resource maps in Chapter 2 and listed in Table 7.1. For each station a data set of meteorological measurements was provided, taken every three hours over a period of approximately 10 years. In addition, an accurate description of the station and its surroundings was collected, which included:

- terrain class, i.e. water areas, open farmland, forests, etc.
- nearby sheltering obstacles such as buildings and wind breaks
- terrain height variations (orography)

The terrain classification comprises four roughness classes, each class corresponding to a typical terrain. The roughness classes are described and illustrated in Figs. 1.2-1.5 which furthermore give the relation between roughness length and roughness class, the former being the commonly used length scale to characterize the roughness of a terrain.

In Chapter 7, a description is given for each station together with a roughness classification. Furthermore, an analysis of the measured data is provided giving the frequency of occurrence of wind speeds in twelve direction sectors and hourly averages month by month.

For the calculation of regional climatologies, the station descriptions and the models were used to transform the measured data set of wind speeds and directions from each station to what would have been measured at the location of the station if the surroundings were as follows:

- flat and homogeneous terrain
- no nearby obstacles
- and measurements had been taken at heights of 10, 25, 50, 100, and 200 m.

For example, one of the transformed data sets represents wind speed and directions at 50 metres above open water.

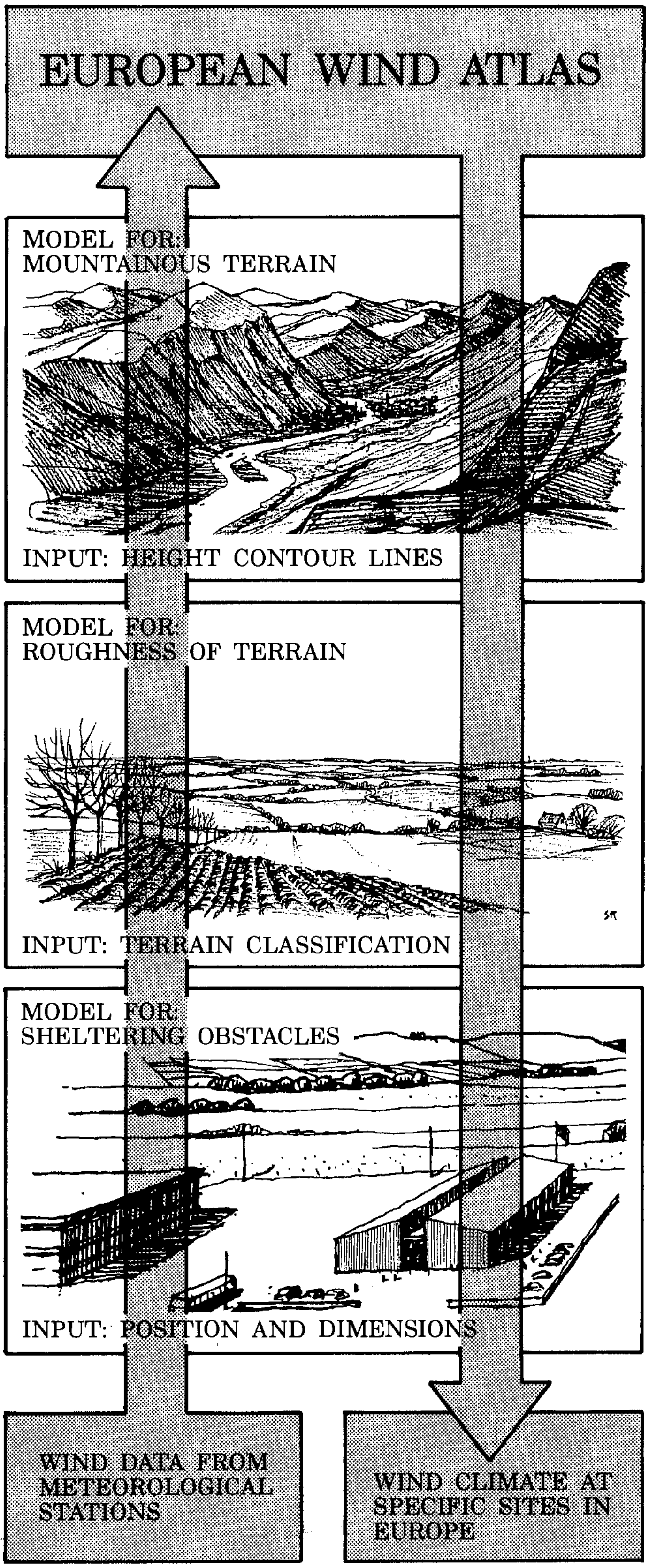


Figure 1.1: The Wind Atlas methodology. Meteorological models are used to calculate the regional wind climatologies from the raw data. In the reverse process – the application of the Wind Atlas – the wind climate at any specific site may be calculated from the regional climatology.

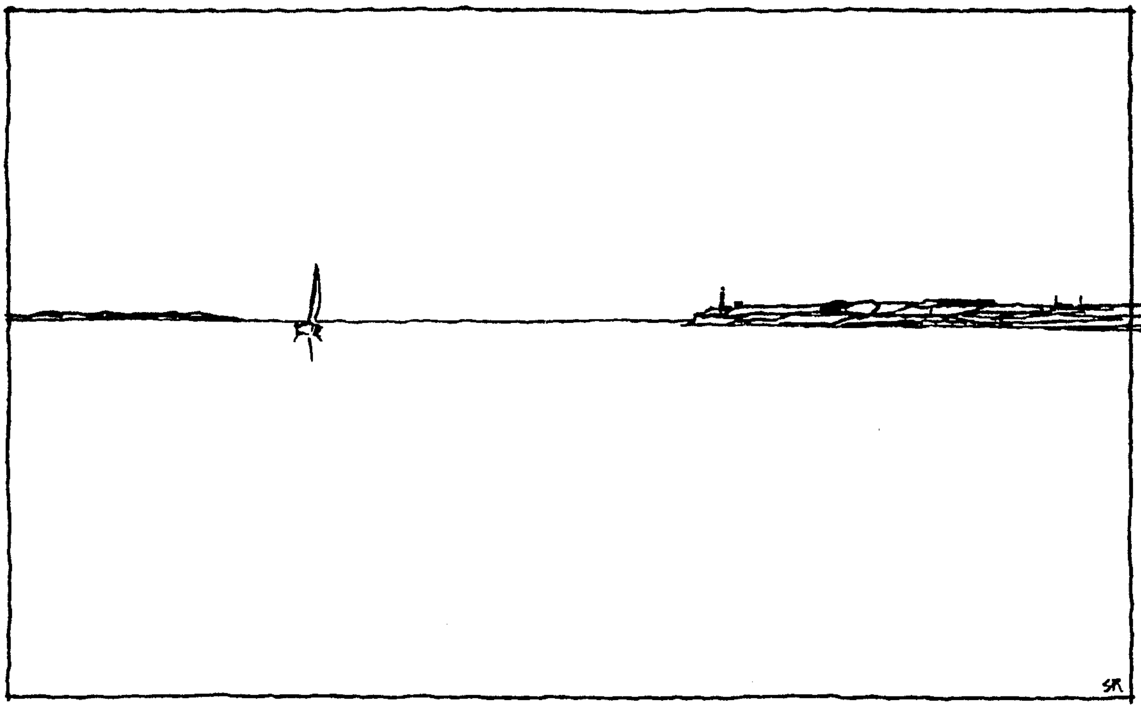


Figure 1.2: Example of terrain corresponding to roughness class 0: water areas (z_0 = 0.0002 m). *This class comprises the sea, fjords, and lakes.*

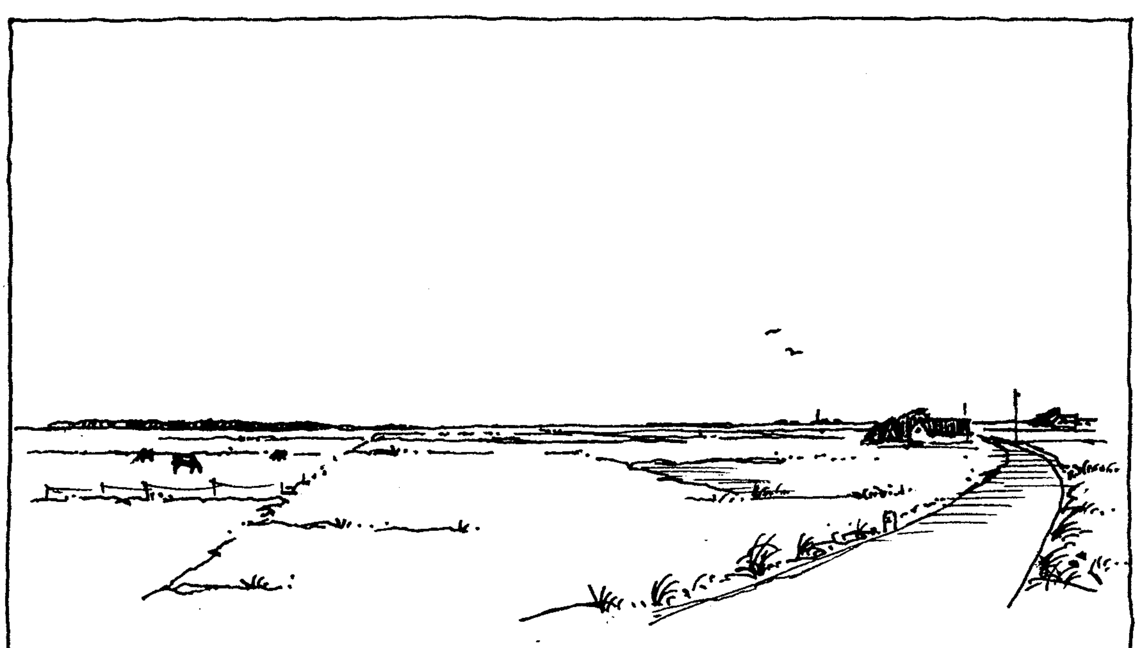


Figure 1.3: Example of terrain corresponding to roughness class 1: open areas with few windbreaks (z_0 = 0.03 m). *The terrain appears to be very open and is flat or gently undulating. Single farms and stands of trees and bushes can be found.*

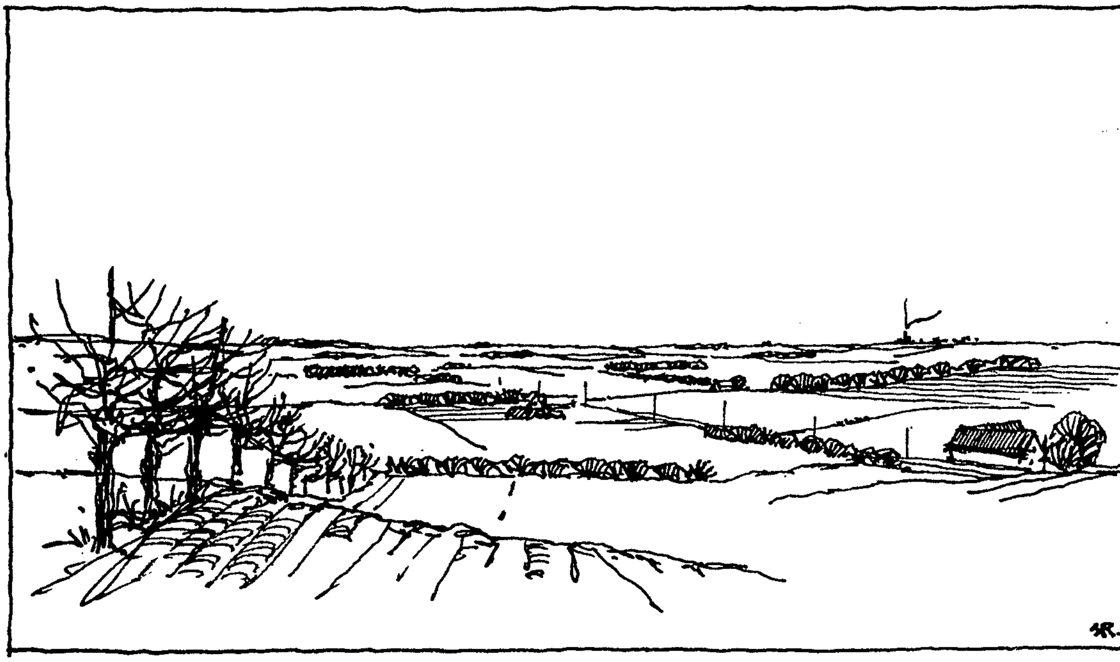


Figure 1.4: Example of terrain corresponding to roughness class 2: farm land with windbreaks, the mean separation of which exceeds 1000 m, and some scattered built-up areas (z_0 = 0.10 m). The terrain is characterized by large open areas between the many windbreaks, giving the landscape an open appearance. The terrain may be flat or undulating. There are many trees and buildings.

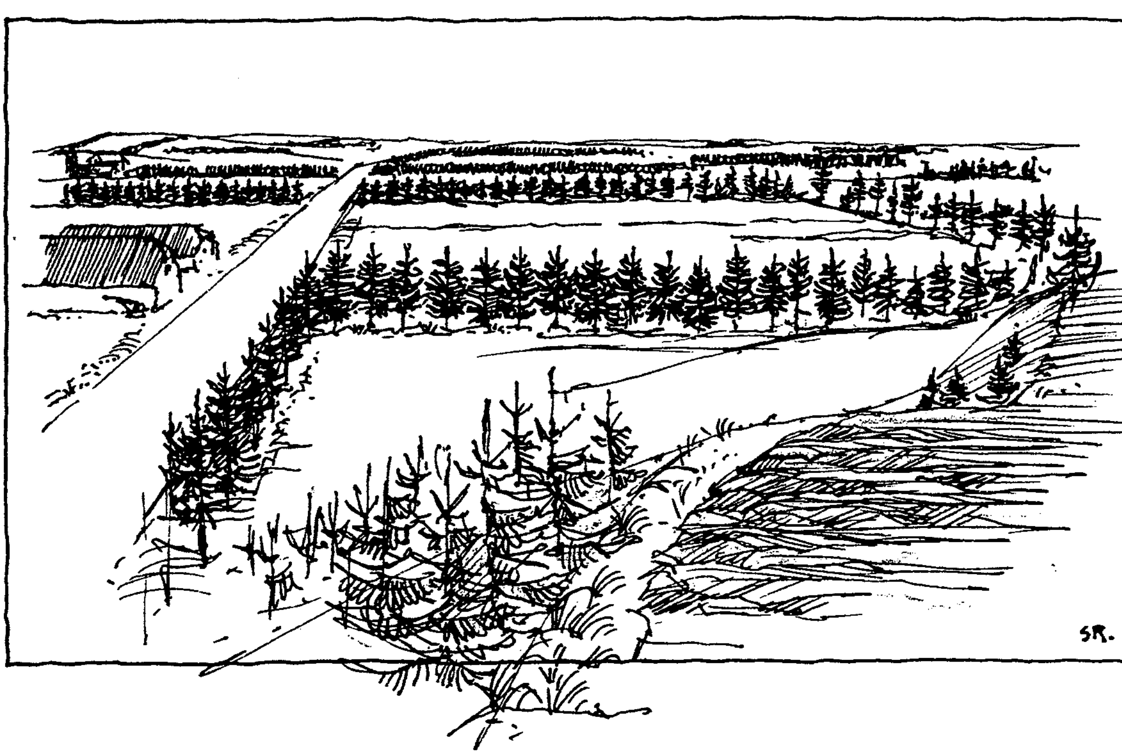


Figure 1.5: Example of terrain corresponding to roughness class 3: urban districts, forests, and farm land with many windbreaks (z_0 = 0.40 m). The farm land is characterized by the many closely spaced windbreaks, the average separation being a few hundred metres. Forest and urban areas also belong to this class.

With four roughness classes and five standard heights, the data set from each station is transformed into 20 data sets. These 20 data sets from each of the 208 stations form the basis of the regional wind climatology, because through the transformation procedure the data sets were - *if possible* - freed from the influence of local topography to become *regionally representative.*

How regionally representative a transformed data set is depends on the complexity of topography and obstacles surrounding the meteorological station. The representativeness of a station is severely reduced with increasing complexity of the surrounding orography. In order to distinguish the stations and to judge their applicability to the surrounding regions, the European landscape has been classified in five types based on the influence of orography on the atmospheric flow. The landscapes are illustrated and defined in Figs. 1.6-1.10.

Transformed statistics from stations in landscape types 1 and 2 can be assumed to apply to a region of approximately 200 × 200 km. Statistics from stations in landscapes of types 3 and 4 might apply to a region of similar size or smaller, depending on the specific situation. Often such stations will be found in wide valleys or foothill regions gradually sloping up to large mountain massifs. Most often statistics from stations in landscape type 5 will be representative only of an area close to the station.

It must be emphasized that the regional climatologies, i.e. the 20 transformed data sets obtained from each station, are based on data measured at low levels, usually at 10 metres height. Not only might the transformation and use of such data for horizontal extrapolation lead to large uncertainties, but also the transformation up to the height of 200 metres is associated with errors. The physical theories which have been used to construct the vertical transformation procedures have proven their validity up to heights of approximately 100 metres through comparisons with data sets from many meteorological towers. Above 100 metres few data sets exist and although the evidence presented in Chapter 9 shows good agreement between measured and modelled data, the statistics derived for heights above 100 metres are associated with larger uncertainties than the uncertainties pertaining to the lower levels.

The most important statistic to be derived from a wind speed data set for use in wind energy resource estimation is the *probability distribution function.* This is because when this function has been determined for a given site, the calculation of the average yearly production of any wind turbine installed at the site is only a matter of integrating the product of this function and the power curve of the wind turbine.

A basic hypothesis of the Wind Atlas is that wind speed data are distributed according to the *Weibull distribution,* which is shown in Fig. 1.11 and explained further in Chapter 8.

Figure 1.6: European landscape of type 1: Plains, water areas and lowland regions far from mountains. Winds near the surface are modified by changing surface roughness and sheltering obstacles only.

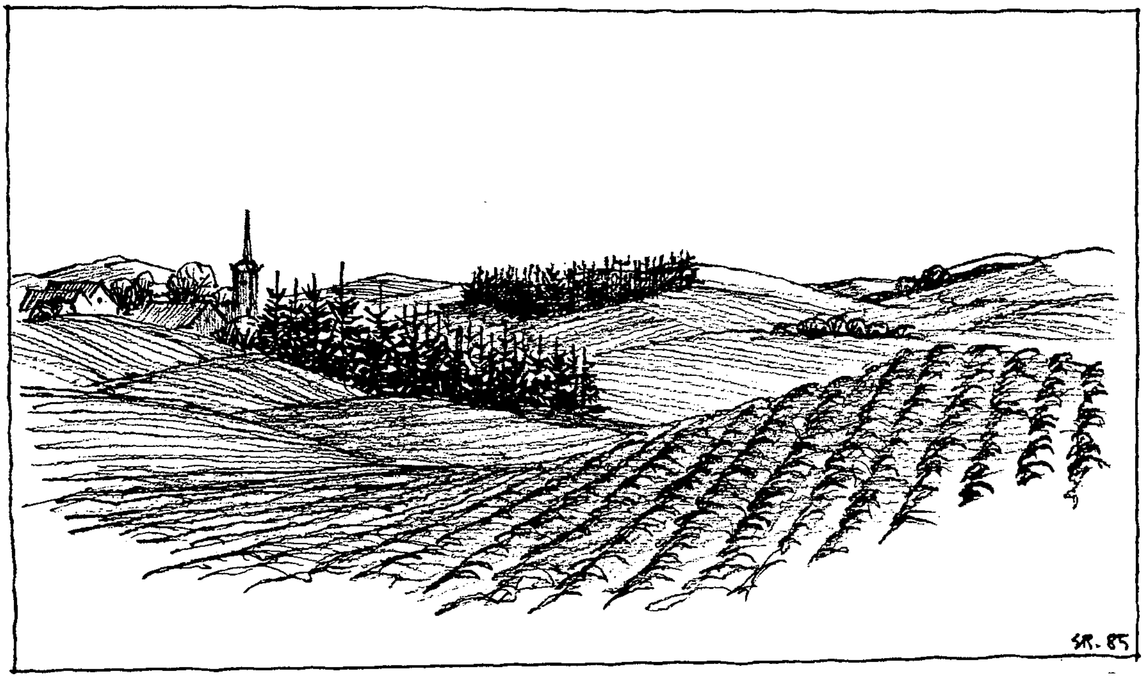


Figure 1.7: European landscape of type 2: Gently undulating and hilly regions far from mountains. Typical horizontal dimensions of the hills are less than a few kilometres. Winds near the surface are modified by changing surface roughness, sheltering obstacles and – most important – by the acceleration induced by the hills.

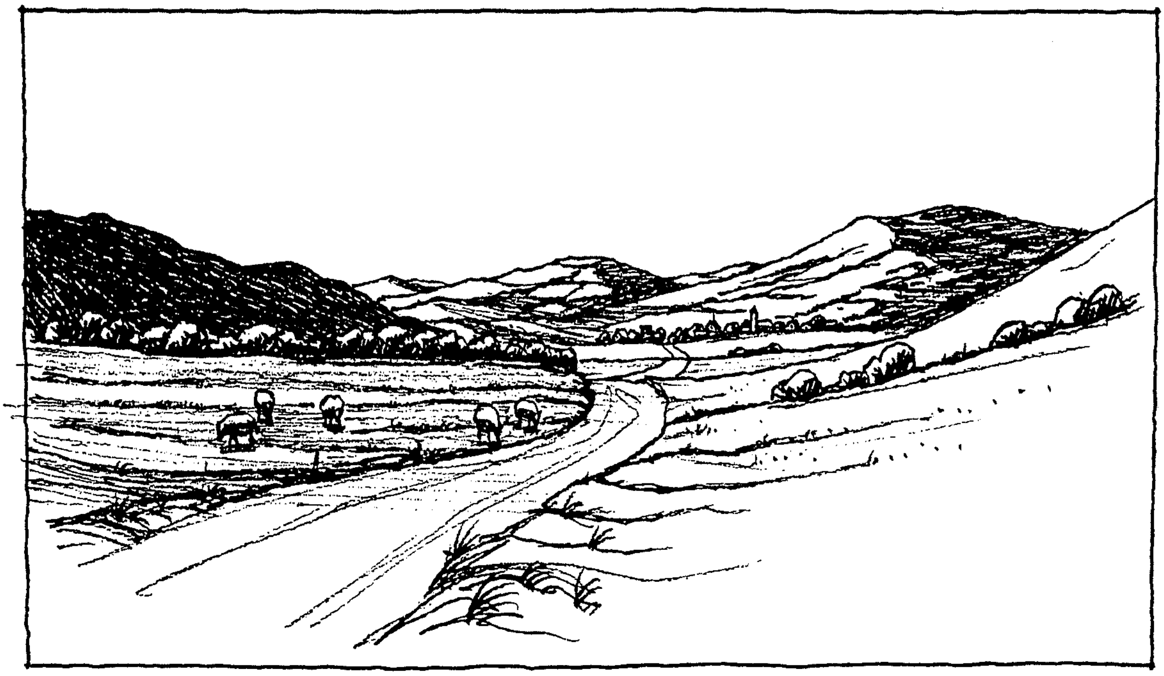


Figure 1.8: European landscape of type 3: Strongly undulating and highland regions ('Mittelgebirgs-relief'). Typical horizontal dimensions of the hills are several kilometres. Winds near the surface are modified by the topography as for landscape type 2. In addition, the larger scale orographic features may induce strong modifications of the entire atmospheric boundary layer.

Figure 1.9: European landscape of type 4: Foothill regions. In these broad sloping regions distinct and persistent flow systems occur, such as: Föhn, Bise, Bora, Mistral, and Tramontana. These flows are caused by processes like channelling, deflection, leeside descent, and hydraulic intensification.

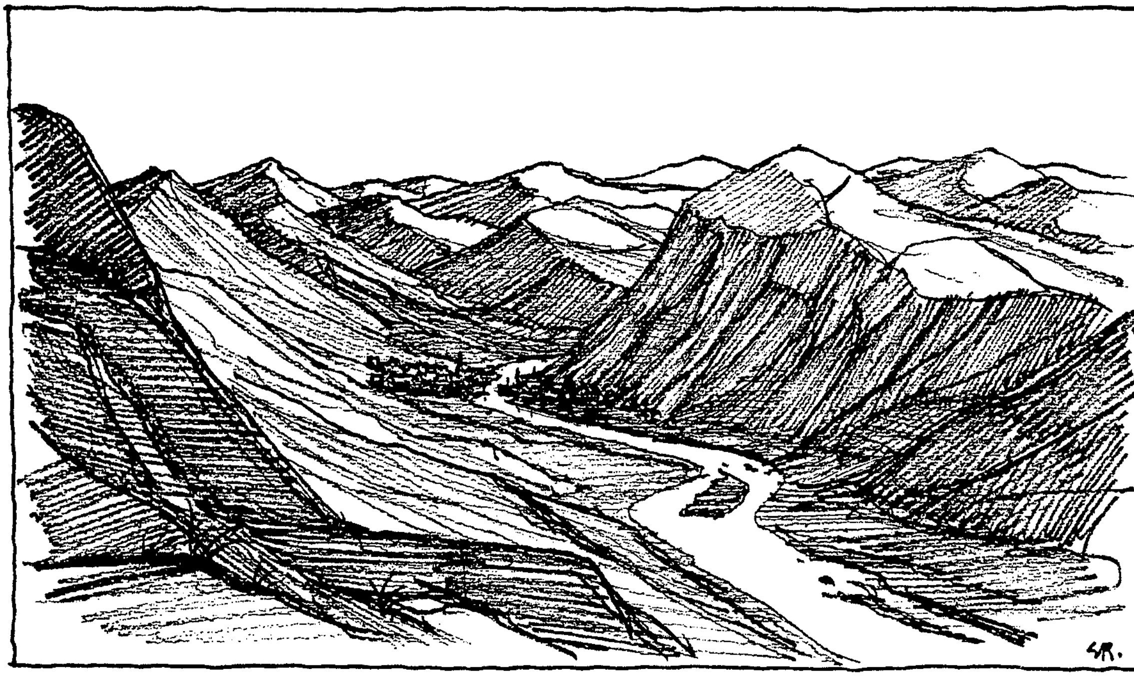


Figure 1.10: European landscape of type 5: High mountain massifs cut by deep valleys. The winds at the peaks may be representative of free atmospheric values depending on the specific conditions. In the valleys thermally-induced mountain valley winds dominate the wind climate. Except for leeside föhn the winds in the valleys are decoupled from the free atmosphere winds.

As shown in Fig. 1.11, the Weibull distribution usually gives a very good fit to observed wind speed data and this has also been found to be true for most of the 208 stations. As Chapter 7 provides both the raw data histograms and parameters of the fitted Weibull distributions, the reliability of the Weibull fit to a specific station can be judged by the reader. The Weibull parameters fitted to the 20 transformed wind data sets are found in the *Total* columns of the station statistics. For the purpose of determining the wind resources at sites in which the roughness class changes with the wind direction - for example a coastal site - each of the 20 wind data sets has been divided into 12 further data sets according to wind direction. The parameters of the Weibull distribution function fitted to the wind speed/wind direction data sets are also given in the station statistics. Finally, the station statistics include a table with mean wind-speed values and the corresponding mean energy content of the wind for four roughness classes and the five standard heights. These values from the 208 stations are the basis of the mean power and mean wind-speed maps in Chapter 2.

It should be stressed that the validity of the statistics derived from a particular station depends both on the quality of the data and the amount of information available. For some stations information has been less detailed for various reasons, e.g. photographs of certain airport stations are classified material for military reasons and therefore not available for the study. It is likely that a user of the Atlas can provide more accurate descriptions of some of the stations than was available for the study.

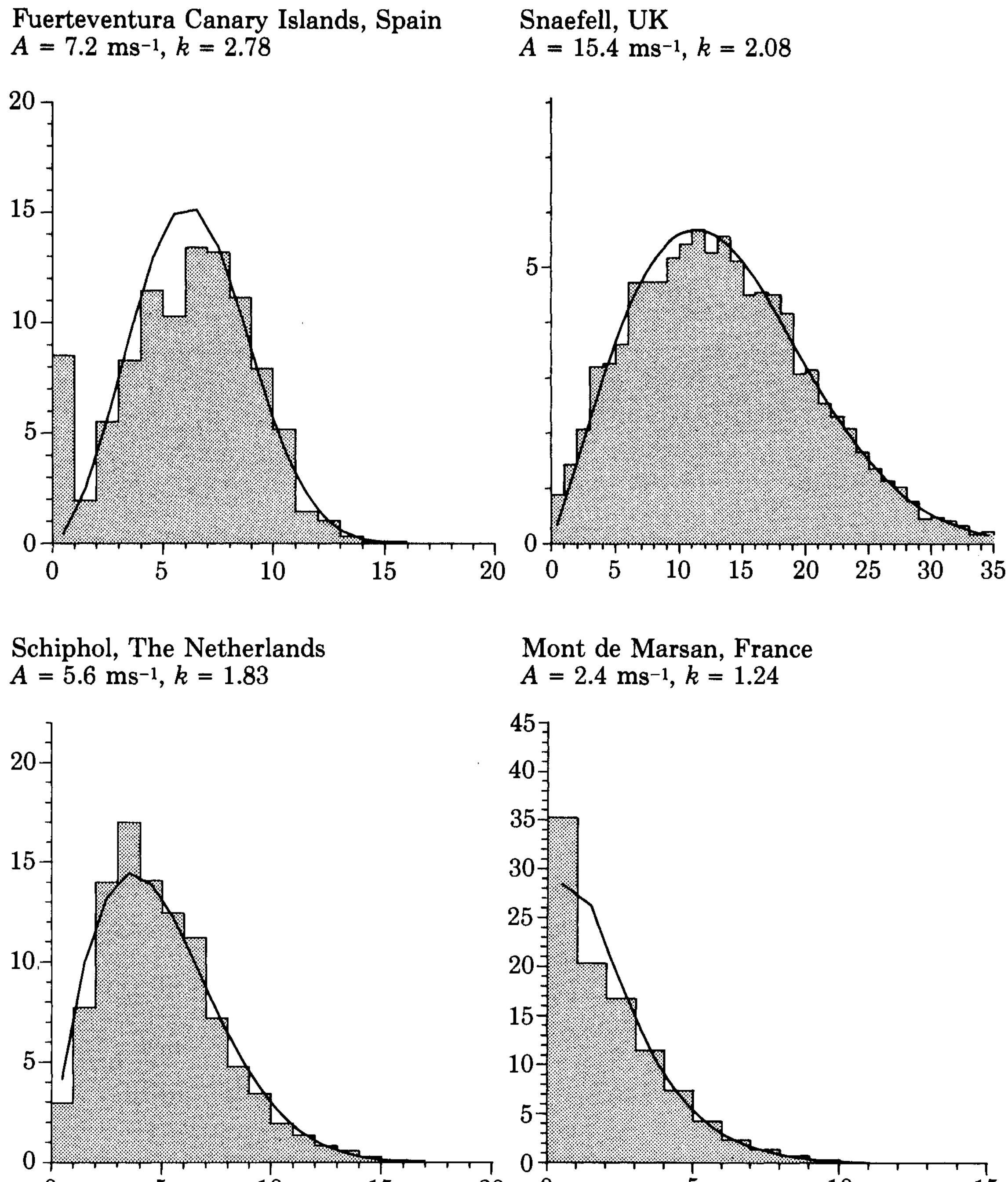


Figure 1.11: Histograms of measured wind speed data and the corresponding fitted Weibull distribution functions for four different stations used in the Atlas. The Weibull parameters are given for each station: the scale parameter A is related to the mean value of the wind speed and the shape parameter k determines the shape of the Weibull curve. See Chapter 8 for further details. Horizontal axes: wind speed in metres per second. Vertical axes: frequency of occurrence in per cent.

It is also possible that a user might wish to extend the Atlas and include more stations. In that case, the user can recalculate the statistics in the Atlas and add more statistics from more stations by means of the computer programme mentioned earlier - the Wind Atlas Analysis and Application Programme - because the analysis part of this programme was used to produce all the regional climatological statistics of the Atlas.

Several other wind climate studies exist, some of which are listed in Chapter 10. In contrast to the detailed methodology for the analysis of the effects of topography used in the Wind Atlas, most studies apply statistical analyses only to the measured data. In some studies rudimentary corrections for different observational conditions are applied to the data in connection with the statistical analysis. Because of the very large variability of wind conditions caused by differences in local topography the detail appearing in many of these studies can be misleading. This is a cause for concern, in particular when maps are drawn from interpolation of wind speeds between stations.

The data which form the basis of the present Atlas cover in most cases the ten-year period 1970-1980. In climatological practice a 30-year period is often taken as the basis. The question therefore arises: to what extent is the period covered representative for the longer-term climate and - more important - how large a deviation must be expected in future decades?

A study of climatic variability in northern Europe (Larsen et al., 1988) shows that during the seventies the mean power in the wind was close to the mean for the period 1873-1982. The study also shows, however, that variations of up to 30 per cent can be expected from one decade to another. Figure 1.12 illustrates the variability.

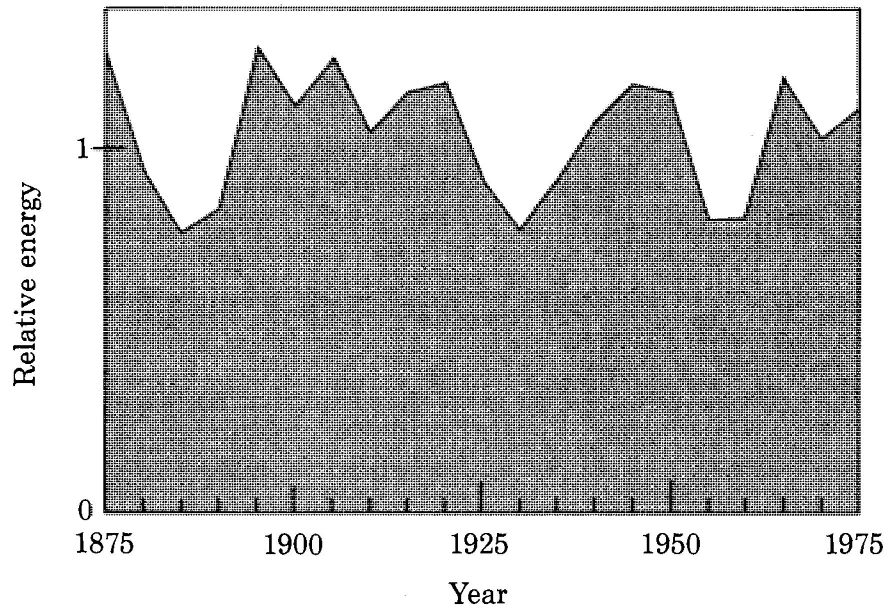


Figure 1.12: Mean energy in the wind for consecutive 5-year periods based on a time series from Hesselø, Denmark, 1873-1982 (Larsen et al., 1988).

In another study (Petersen et al., 1981) it was found from an analysis of the expected power output for a 45-m high wind turbine over a 22-year period that the interannual variation in power corresponds to a mean relative standard deviation of approximately 13 per cent.

For a proper assessment of the economics of wind power utilization, such variability must obviously be borne in mind. In comparison with other important factors such as rates of interest and prices of other fuels, the uncertainty in the wind resource is not large over the lifetime of a wind turbine of, say 20 years. Based on the studies cited above one can estimate the variation of the mean power from one 20-year period to another to have a standard deviation of $\sim$ 10 per cent or less.

It has been pointed out above that the reliability of a wind power calculation based on the statistics in the Wind Atlas depends on the reliability of the data from the particular station from which the statistics have been derived. An appraisal of the data quality for most of the stations can be made by means of the station descriptions and the set of figures termed the *wind climatological fingerprint* in Chapter 7. The fingerprint shows the yearly and daily variation of the mean wind speed and the mean power content in the wind. Also shown are the wind rose, the variance spectrum and the deviation month by month of the mean wind speed and mean power from the average year. The latter statistic enables the user to judge the year-to-year variability at a station and hence to discard or treat with special care stations with a pronounced trend in the data.

Part I
THE WIND RESOURCE

Chapter 2

The wind resources of Europe

Wind energy resources vary greatly over Europe, from the maritime climate of the British Isles to the continental climate of central Germany and the Mediterranean climate of the Greek islands. The resources vary by more than a factor of ten on the energy scale. But not only does the mean energy content in the wind vary over large distances - substantial variations can be experienced over short distances also. Therefore reliable data and methods are a prerequisite for the determination of regional wind energy resources as well as the resources of selected locations.

The purpose of the Wind Atlas is thus twofold: both to present wind data and to provide methodologies for generalizing wind data to a surrounding region for use in estimations of wind energy potentials and wind turbine siting.

This chapter begins with a short description of the European wind climate as it can be deduced from the meteorological stations used in the Wind Atlas analysis. For a more general description of the climate of Europe the reader is referred to the extensive volumes of the "World Survey of Climatology" (Landsberg and Wallén, 1970, 1977). Next in the chapter come a set of wind resource maps which provide a means for estimating the wind energy resources at a height of 50 metres above the ground. The maps depict the geographical distribution of five wind energy classes, each class representing a range of mean wind power density or equivalent mean wind speed, the range being topography-dependent. The expected ranges of mean power density and mean wind speed are given in a table for five different topographic conditions: sheltered conditions, flat open farmland, the sea coast, open sea, well exposed hills and ridges. These conditions are chosen to illustrate typical wind energy ranges and the estimates should be considered only as such. It should be stressed that local terrain features can cause a considerable variability in the mean power over short distances, especially in areas of coastal, hilly and mountainous terrain. The maps do not in general depict variability caused by local terrain features, but can be used together with the table and knowledge of local topography to identify reasonably large areas with a possible high wind resource. It has however been attempted to predict locations where some very local wind systems - favoured by topography and large differences in the surface temperature - may exist. At such locations concentration effects can give rise to high wind energy potentials. Owing to lack of data, these locations have been indicated on a subjective basis. They are shown on the maps by small circles. Note that the effects of the Mistral and Tramontana - which are not in the category of very local wind systems - are well documented by data, and appear clearly on the maps.

2.1 The wind climate of Europe

The wind regime of Europe is influenced by three major factors, namely the large temperature difference between the Polar air in the north and the Subtropical air in the south; the distribution of land and sea with the Atlantic Ocean to the west, Asia to the east and the Mediterranean Sea and Africa to the south; and the major orographic barriers such as the Alps, the Pyrenées and the Scandinavian mountain chain.

A notable characteristic of the European wind climate is the wind regime north of about 40°N consisting mainly of migratory cyclones and anticyclones moving in an eastward or northeastward direction over the North Atlantic into Europe.[†] The vigorous movements north of 40°N can at times be felt throughout most of Europe and even to the Aegean Sea, but in general when the cyclones move from the sea over land they are retarded and weakened. Hence away from the Atlantic Ocean their influence on wind climates decreases and other effects prevail.

From a wind energy point of view it appears sufficient to distinguish two types of wind climates in Europe:

- wind climates at locations where the power that can be converted from the wind comes mainly from the eastward-moving cyclones

- wind climates at locations where the power that can be converted from the wind is only partly - if at all - due to the eastward-moving cyclones.

The area most strongly under the influence of the generally *eastward-moving* weather systems is shown in Fig. 2.1. It is characteristic of the wind climate of this part of Europe that the mean geostrophic wind, which is approximately the mean wind at the height of 1500 metres, is well defined over large regions. A general gradient in the wind climate from NW to SE is clearly depicted in Fig. 2.1.

[†]Cyclones are wind systems associated with low-pressure centers that are created along the polar front which separates the cold polar and warmer subtropical air masses.

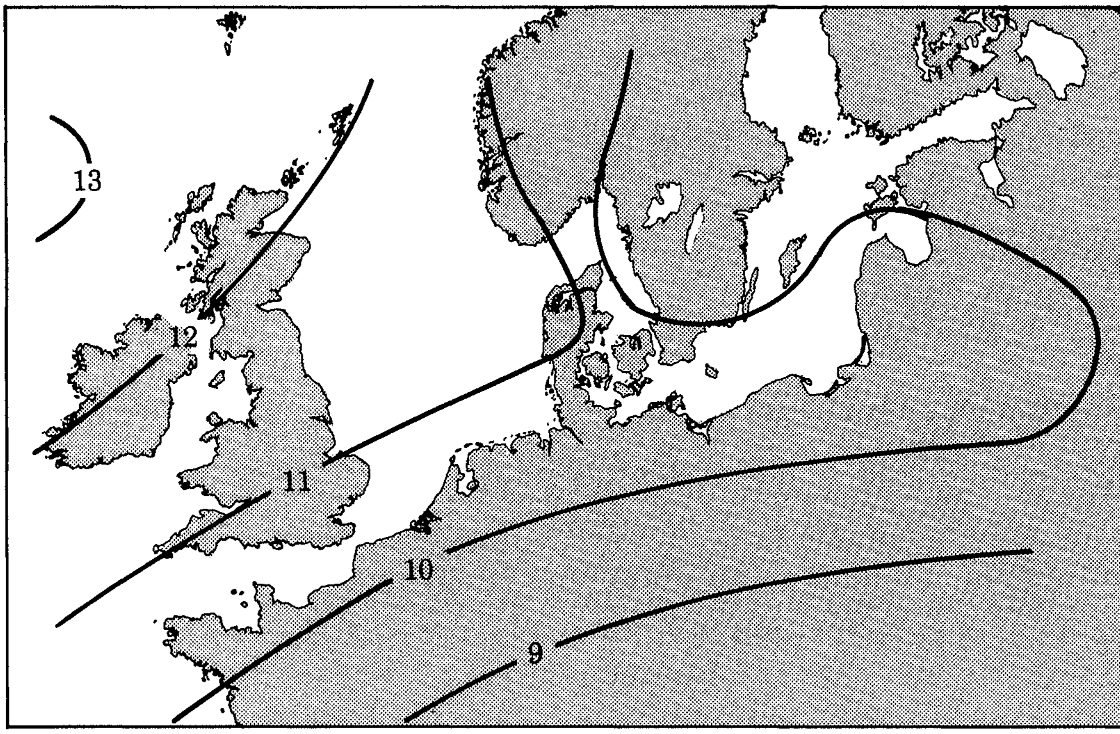


Figure 2.1: The mean geostrophic wind over Northern Europe in metres per second. Based on data from Børresen (1987) and the statistics in Chapter 7.

The *second type* of wind climate identified above dominates most localities of the regions shown in Fig. 2.2, where Africa, the Mediterranean Sea, the Alps and the prevalent mountainous terrain give rise to many local wind systems such as the Mistral, a strong northerly wind, which penetrates the Rhone valley and spreads along the French Riviera into the Mediterranean Sea for long periods during winter; the Scirocco, which brings air masses with large quantities of Saharan dust over the Mediterranean Sea into central and eastern Europe; the Etesians in the region of southeast Europe, which have a remarkable constancy in direction and strength; the Bora in the eastern Adriatic Sea which brings a strong and gusty wind originating from air masses breaking through a narrow pass in the Alps; the Levante, an easterly wind blowing towards the east coast of Spain and in the Strait of Gibraltar; the Vardarac (Verdarro), a northerly wind blowing on the northern coast of Salonika. Several other local wind systems are known, for example the Bise and the Tramontana. A special phenomenon is the Föhn, occurring in many parts of Europe. The most well known Föhns are those occurring in and around the Alps. The North Föhn is a layer of cold air which overflows the chain of Alps, resulting in a gusty flow of cold air along the southern slopes of the Alps. The South Föhn is the reverse of the North Föhn: a warm dry wind in the Alps and on the northern slopes of the Alps.

The climatological description and classification of a particular location is not always a simple matter. The basic data in the Wind Atlas are the wind speed frequency functions. In addition the Atlas provides statistics which describe the wind climatological conditions at each station. Before proceeding to a discussion of this set of wind climatological statistics it might be worth while to consider definitions of the terms "Weather" and "Climate". H.H. Lamb provides ample definitions (and recommendable climatological information) in the volume "Climate: Past, Present and Future" (Lamb, 1972):

Weather is the totality of atmospheric conditions at any particular place and time - the instantaneous state of the atmosphere and especially those elements of it which directly affect living things. The elements of the weather are such things as temperature, atmospheric pressure, wind, humidity, cloudiness, rain, sunshine, and visibility.

Climate is the sum total of the weather experienced at a place in the course of the year and over the years. Because the average conditions of the weather elements change from year to year, climate can only be defined in terms of some period of time - some chosen run of years, a particular decade or some decades.

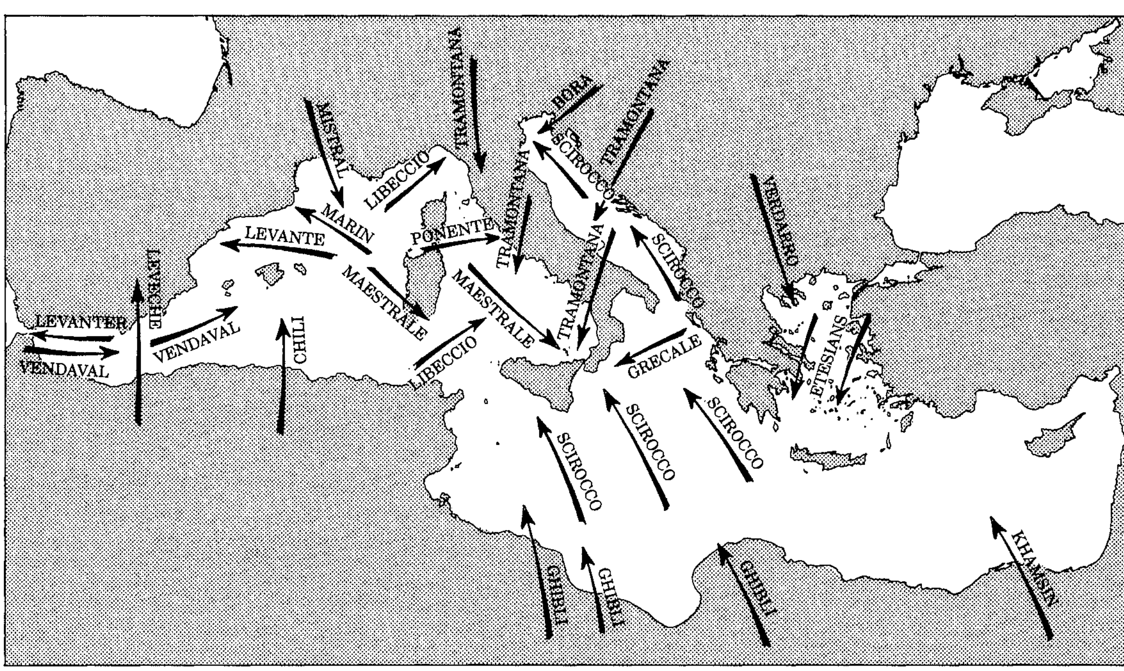


Figure 2.2: Principal winds of the Mediterranean region. A brief description of each wind is given in Huschke (1959). From: Series Grandi Progetti di Ricerca 3, ENEL, Italy.

Many different types of wind statistics could be considered for a description of the wind climate of a locality or a region. The set of statistics given for each station in Chapter 7 is selected on the basis of the experience gained during the Wind Atlas analysis, which indicates that the collective information in the set usually gives a good representation of the wind climate. Each set of statistics is given in two tables in the *Raw data summary* and a graphical presentation is given in five figures termed the *Wind climatological fingerprint*. The details of the statistics are described in Chapter 7 and only two important climatic indicators will be discussed here: the sectorwise histograms of wind speed and the daily and yearly variations.

The sectorwise histograms of wind speed (The wind speed distribution function). This is a type of wind rose in which the measured wind speeds are arranged according to direction (12 sectors) and in bins of 1 $m\,s^{-1}$. High frequencies of low wind speeds indicate an inland climate such as is found at the German stations München, Nürnberg and Stuttgart and/or stations surrounded by sheltering mountains such as the French stations Mont de Marsan, Perpignan and Carcassonne. For the last two stations the statistics also reveal preferred wind directions along a valley. Stations strongly under the influence of the Westerlies can be identified by having high frequencies and high wind speeds in the sectors from around 210° to 330°. Examples are Belmullet in Ireland, Benbecula in the UK, Hamburg in Germany and Cambrai in France.

The daily and yearly variation of wind speed The average daily and seasonal variations of wind speed are often good indicators of the type of wind climate. A small daily variation throughout the year is characteristic of oceanic climates or sites at large summits: examples are the two lightships - Texel (Netherlands) and Horns Rev (Denmark) - and Snaefell (Isle of Man, UK, height 615 m). A large daily variation in all months indicates locations in southern Europe, whereas a large daily variation in summer and a small variation in winter are to a large extent characteristic of Europe north of the Alps. The yearly as well as the daily variations are affected by both the large-scale and the local conditions, but the yearly variation is usually indicative of the regional climatology. Examples are the Canary Islands, Spain, situated in the Trade Wind Belt, showing a maximum during the summer months, as compared with most stations in northern Europe which have a minimum in the same months.

A full discussion of local European climatologies, based on the statistics in Chapter 7, would exceed the scope of this Atlas. Nevertheless, by studying and comparing the detailed information given in Chapter 7, the reader will gain an overall impression of the European wind climate.

2.2 Wind resource maps

The European wind resources are portrayed in 15 coloured maps. The colours symbolize the available wind resources. The maps can serve two main purposes. One is to identify large regions with good promise for widespread exploitation of the wind resource. The second purpose is to show the relative difference over Europe of the basic wind resource. Actual wind resources may vary greatly over short distances due to topography and to show such detail would call for maps of much higher resolution. Hence for the preparation of the maps it has been necessary to remove the influence of local topography and consider only the differences on larger scales. The maps are compiled using the data from all the meteorological stations included in the Wind Atlas. The stations are listed in Chapter 7 and the methods used for the removal of local influences on the data are described throughout the Atlas, in particular in Chapter 8.†

The resource maps are thus designed to show the variation of the wind resources over wide open plains at some distance away from mountains and coastlines. The abrupt change from one colour to another does not reflect the actual wind resources but is an artifact caused by the illustration technique.

In mountainous areas the impression given by the maps is less reliable. As a means for judging the influence of the mountains and thereby the degree of reliability, the maps are provided with a signature for *relative relief*, i.e. the difference between the highest and lowest level within unit areas of 100 km^2. Although the maps generally do not show effects of local topography, an exception is made with respect to what is termed *local concentration effects*. Topography which favours such effects is typically valleys and canyons sloping downward from mountains in a direction parallel to the large-scale prevailing wind and with a constriction at some point. Another example is basins which receive a flow of cold air from the surrounding mountains (Wegley et al., 1980). The considerable wind energy development that has taken place in California from 1980 and onward is mainly due to the existence of concentration effects occurring at the coastal and inland passes through which cooler marine air from the Pacific Ocean is funnelled to the warmer, drier valleys in the interior of California. Among the major passes, or wind corridors with high wind resources and large wind farms are: Altamont Pass, Tehachapi Pass, and San Gorgonio Pass (Elliot et al., 1986).

It is unlikely that effects so pronounced as in those passes will be found in Europe, but the existence of some favourable areas is anticipated, especially in the southern part of Europe. Owing to lack of data the locations have not been identified for the Wind Atlas, but the maps give subjective indications of potential areas.

The qualitative representation of the wind resources given by the maps can be expressed in more quantitative terms such as yearly production of energy in kWh. For this two things are needed: the characteristics of a wind power conversion system – for example the power curve of a wind turbine, and knowledge of the effect on available wind power from local topography. The last item is elucidated in the legend on the maps, which gives mean wind speeds and mean power densities at a height of 50 metres for localities in five different topographical settings. In Chapter 4 it is shown how these numbers can be transformed to other heights and used in practical calculations.

†The local scale influences in this context are the sheltering by nearby buildings and the modification of the wind by the terrain out to 10 to 20 km from the measuring station.

As an example of a quantitative representation of the wind resources, which illustrates regional variations as well as the dependence on topography, consider the question: How many households can a large wind turbine provide with electricity when the turbine is 50 metres high, the diameter of the rotor 50 metres, the rated effect 1 MW, and the consumption of one household is 4500 kWh per year?† The answer can be found in Fig. 2.3 because in this special case the number of households turns out to be of the same magnitude as the power density at 50 metres. Then, for example, at the coast in northwestern France, between 400 and 700 houses can be supplied from this wind turbine, and approximately the same numbers in central Portugal if the turbine is situated on a large well-exposed ridge, and provided that the consumption is the same in both countries as stated above.

In conclusion, the maps reveal that areas potentially suitable for wind energy applications are dispersed throughout most of Europe. Major areas that have a widespread high wind energy resource include: the British Isles, the North-Sea region of western continental Europe, the northwestern part of the Iberian Peninsula, and a majority of the Greek islands. In the Mediterranean some regions enjoy - from a wind energy point of view - the benefit of certain particular atmospheric processes giving rise to favourable wind conditions. Well known wind systems are the Mistral, the Tramontana and the Bora. Some very local wind systems - favoured by topography and large differences in surface temperature - may exist all over Europe, especially in the southern part. At such locations concentration effects can give high wind energy potentials. Owing to lack of data the locations have not all been objectively identified for the Wind Atlas. Finally, because of the possible enhancement of wind energy potential that can be expected in certain topographical conditions such as well-exposed hills and coastlines perpendicular to the prevailing wind, it is possible to find suitable sites all over Europe where the wind energy can be utilized - even in regions which on the maps appear with the lowest potentials. It may not be possible to identify good sites in regions of a generally low potential by means of the Wind Atlas. For the evaluation of the wind resource at such sites it is necessary to conduct wind measurements over some years at promising locations. The methods discussed in the Wind Atlas can aid in the selection of sites and the design of measurements.

†This is the average electricity consumption of a Danish household which does not use electrical heating.

2.3 Legend to the wind resource maps

The wind resources and relative relief of the EC countries are shown on 15 coloured maps on the following pages. Major rivers and the frontiers are also shown.

The wind resources pertain to 50 metres above ground level and the legend gives the mean wind speed and mean wind power density for 5 different topographical conditions. Areas where local concentration effects are expected to occur, but for which measurements were not available, are indicated on the maps by circles.

The relative relief is the difference in altitude between the lowest and highest level within unit areas of 100 km^2 - here circles with a radius of 5.6 km (Rutkis, 1971). For the purpose of the Atlas the relative relief is shown in three rather coarse classes:

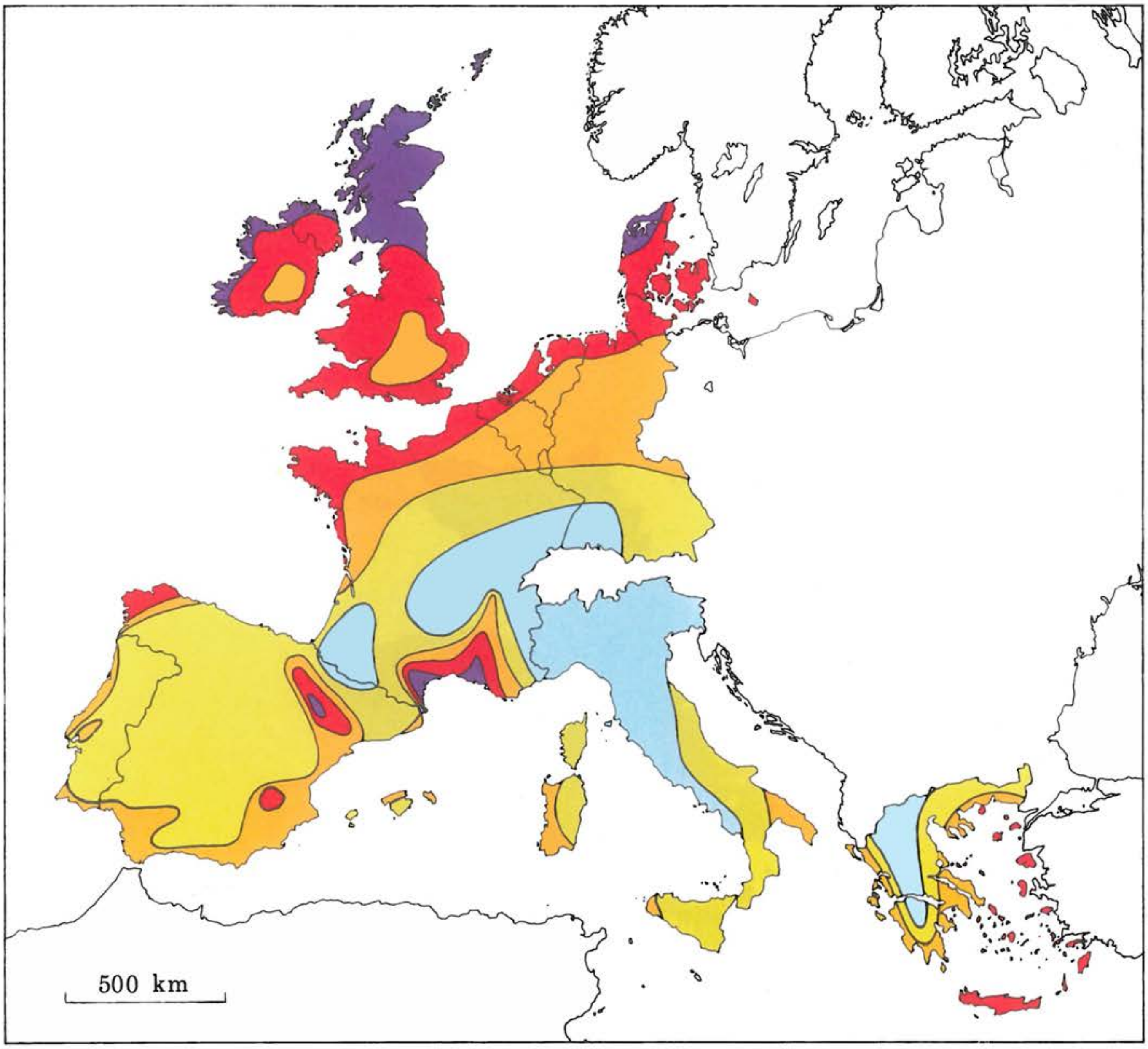
Shading		Relative relief [m]
none		0-200
light		200-800
dark		> 800

The relative relief is not shown on the maps of Greece and the Atlantic islands of Portugal and Spain as the information for these areas was not available.

A more detailed map of the relative relief of western Europe, showing the relative relief in eight classes, is provided by William-Olsson (1974).

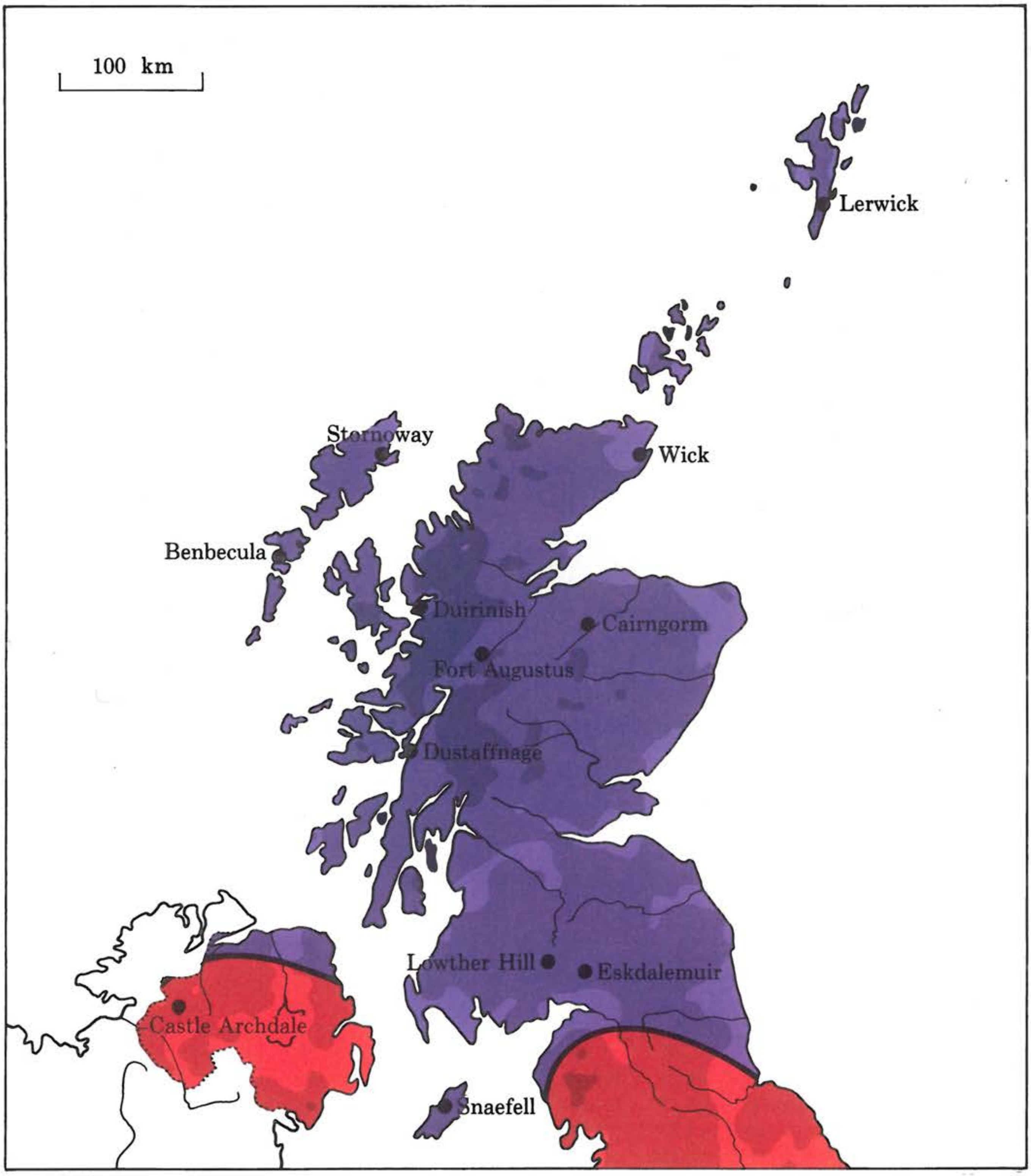
Although there is no direct correspondence between the relative relief shown on the maps and the European landscape types mentioned in Chapter 1, landscapes of types 1 and 2 are most certainly in the class with the smallest relative relief, whereas landscapes of type 5 are located mostly in the dark shaded areas. Areas with a light shading are likely to be of type 3 or 4.

Figure 2.3: Distribution of wind resources in Europe. By means of the legend the available wind energy at a height of 50 metres can be estimated for five topographic conditions. Regions where local concentration effects may occur are not *indicated. The Azores, Madeira and the Canary Islands are not shown on this map but can be found on one of the detailed maps.* ▶

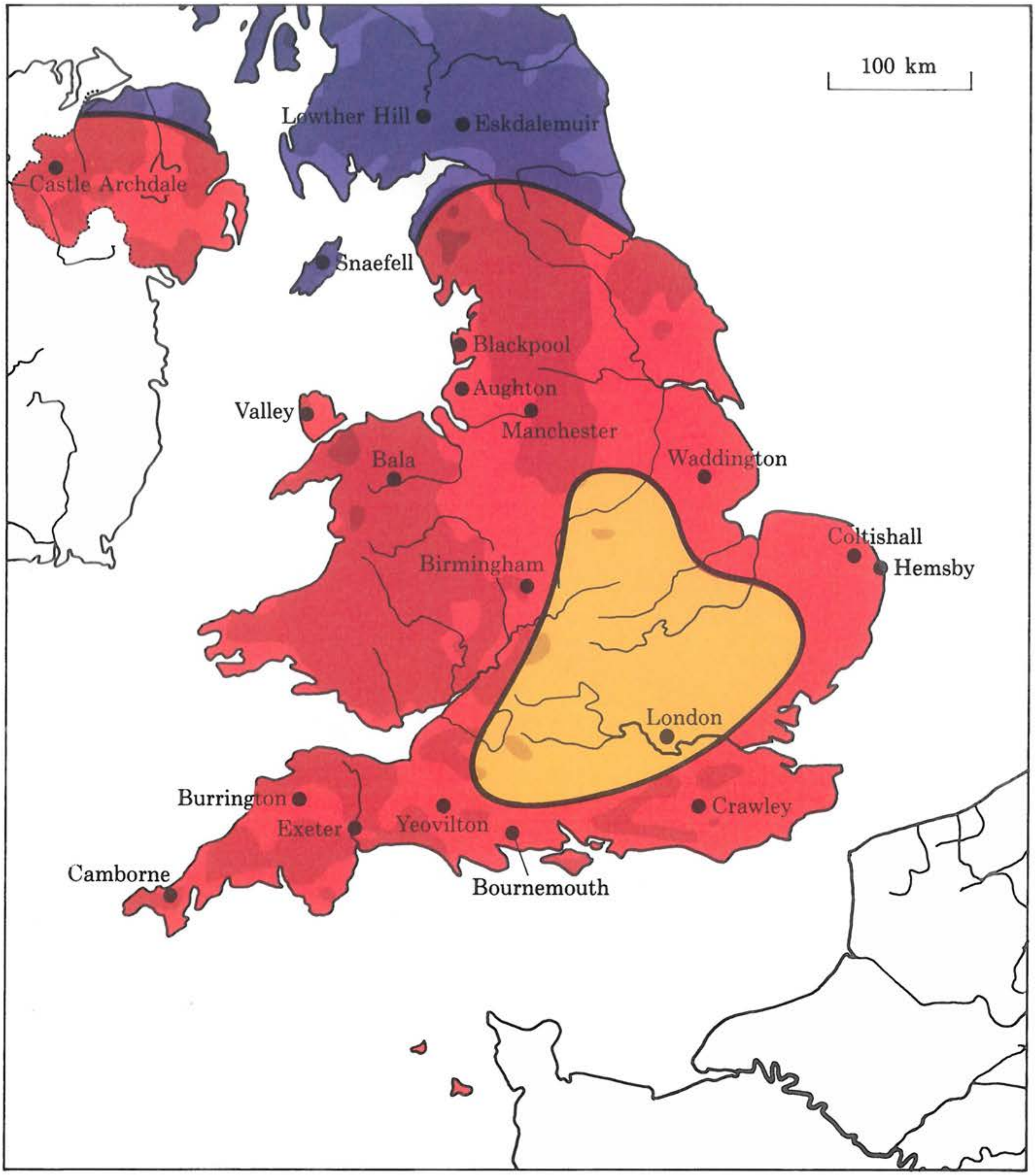


Wind resources[1] at 50 metres above ground level for five different topographic conditions										
	Sheltered terrain[2]		Open plain[3]		At a sea coast[4]		Open sea[5]		Hills and ridges[6]	
	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}	$m\,s^{-1}$	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400

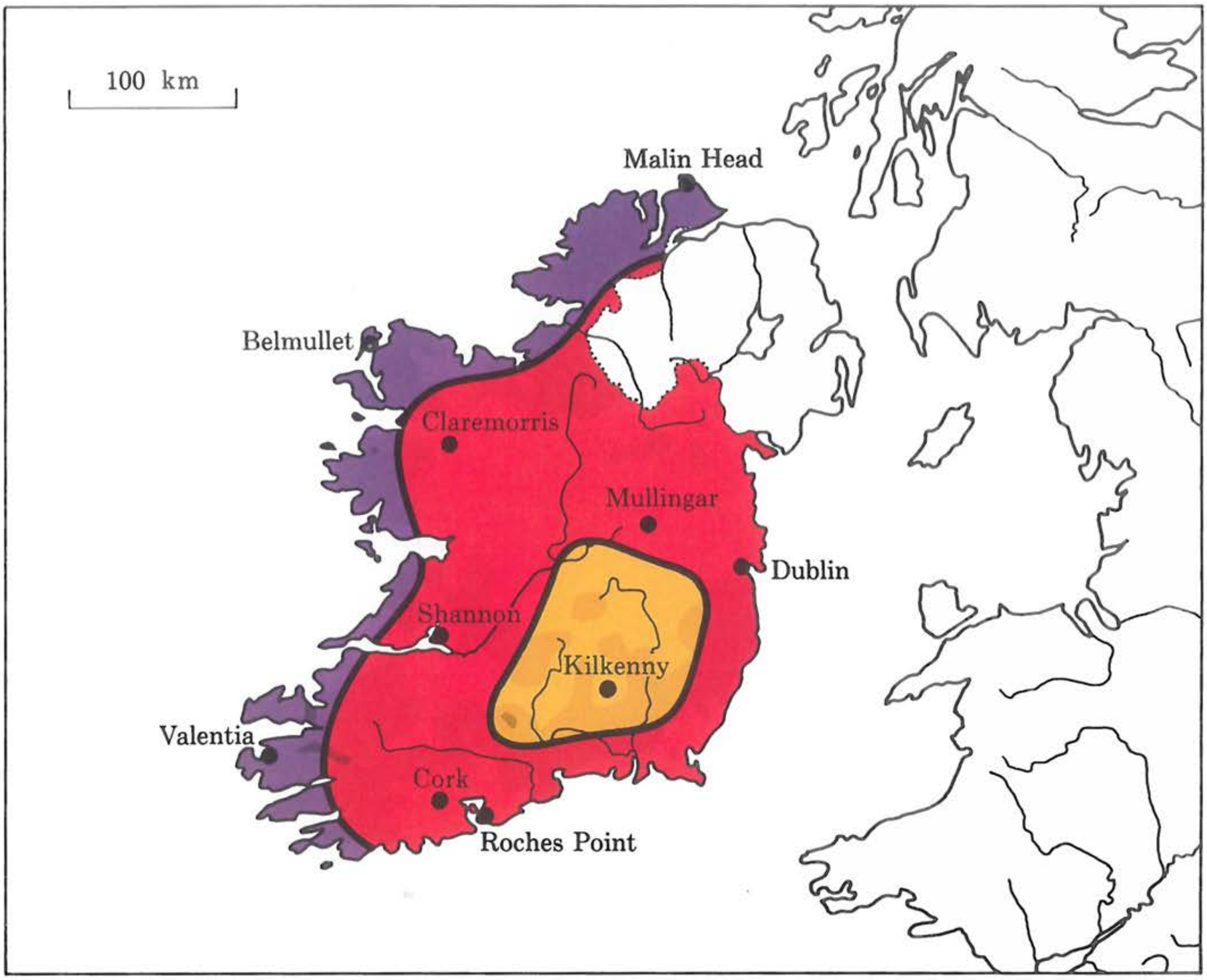
1. The resources refer to the power present in the wind. A wind turbine can utilize between 20 and 30% of the available resource. The resources are calculated for an air density of 1.23 $kg\,m^{-3}$, corresponding to standard sea level pressure and a temperature of 15°C. Air density decreases with height but up to 1000 m a.s.l. the resulting reduction of the power densities is less than 10%, see Table B.1 in Appendix B.
2. Urban districts, forest and farm land with many windbreaks (roughness class 3).
3. Open landscapes with few windbreaks (roughness class 1). In general, the most favourable inland sites on level land are found here.
4. The classes pertain to a straight coastline, a uniform wind rose and a land surface with few windbreaks (roughness class 1). Resources will be higher, and closer to open sea values, if winds from the sea occur more frequently, i.e. the wind rose is not uniform and/or the land protrudes into the sea. Conversely, resources will generally be smaller, and closer to land values, if winds from land occur more frequently.
5. More than 10 km offshore (roughness class 0).
6. The classes correspond to 50% overspeeding and were calculated for a site on the summit of a single axisymmetric hill with a height of 400 metres and a base diameter of 4 km. The overspeeding depends on the height, length and specific setting of the hill.



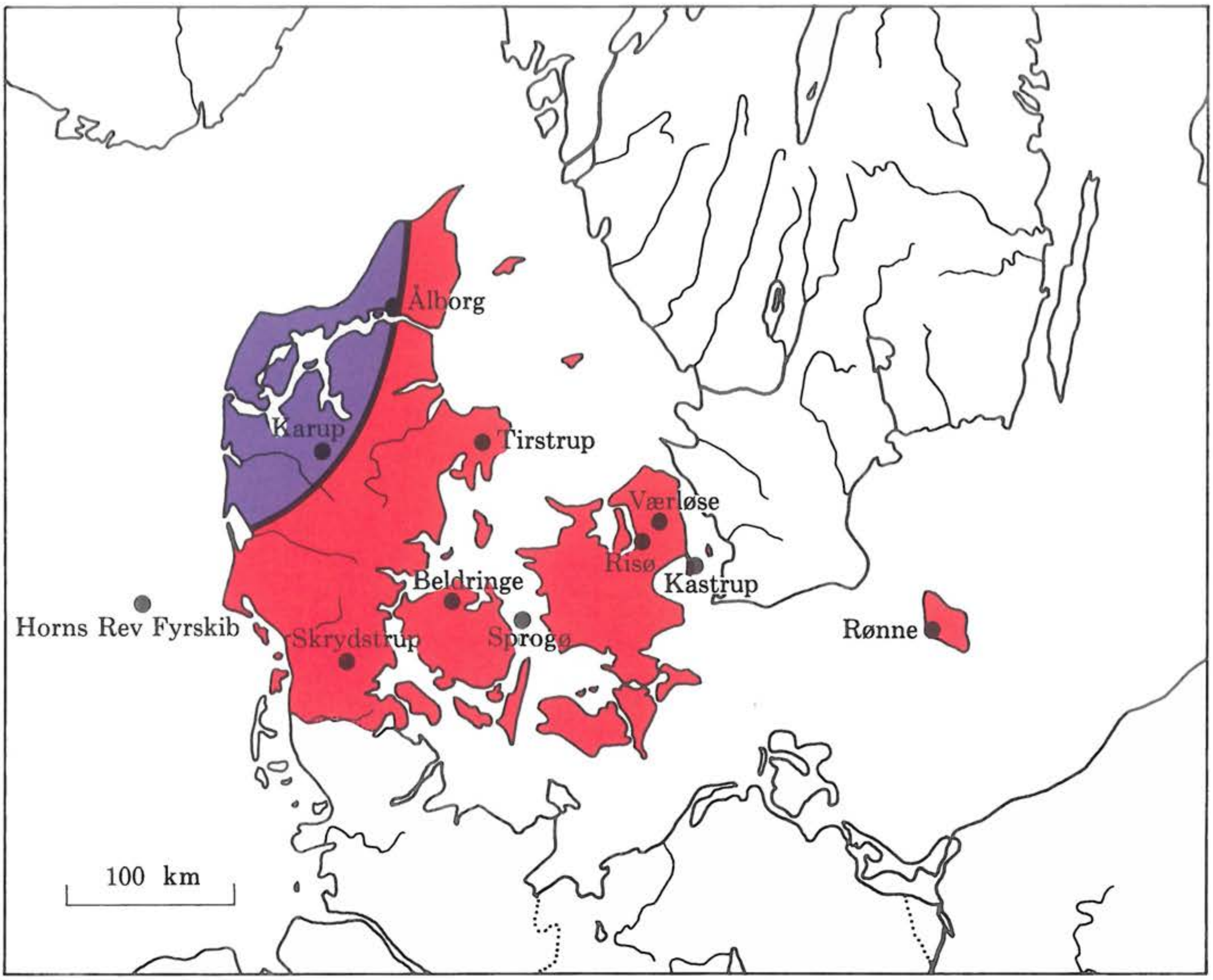
Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			



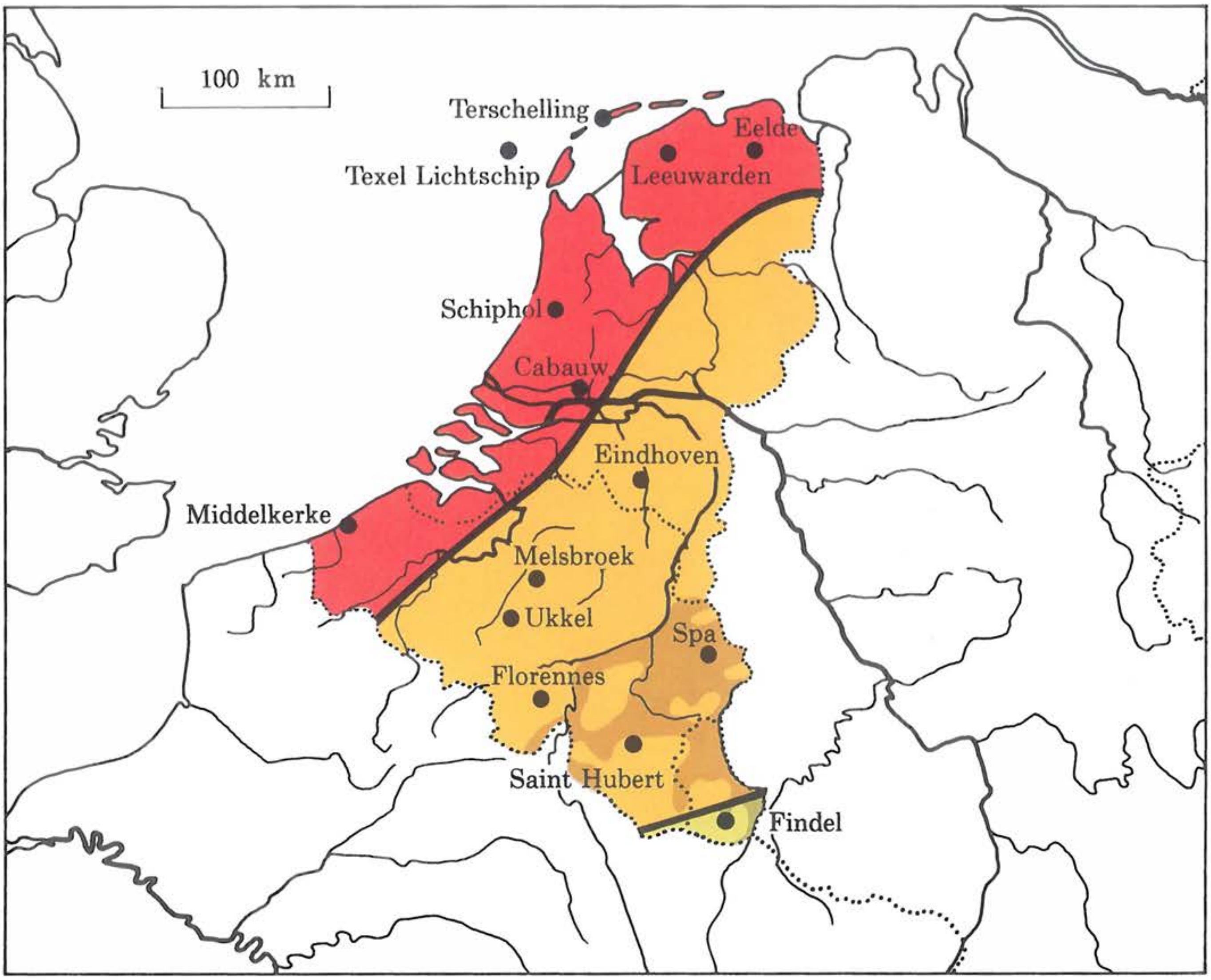
Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur							* see Fig. 2.3 for full explanation		



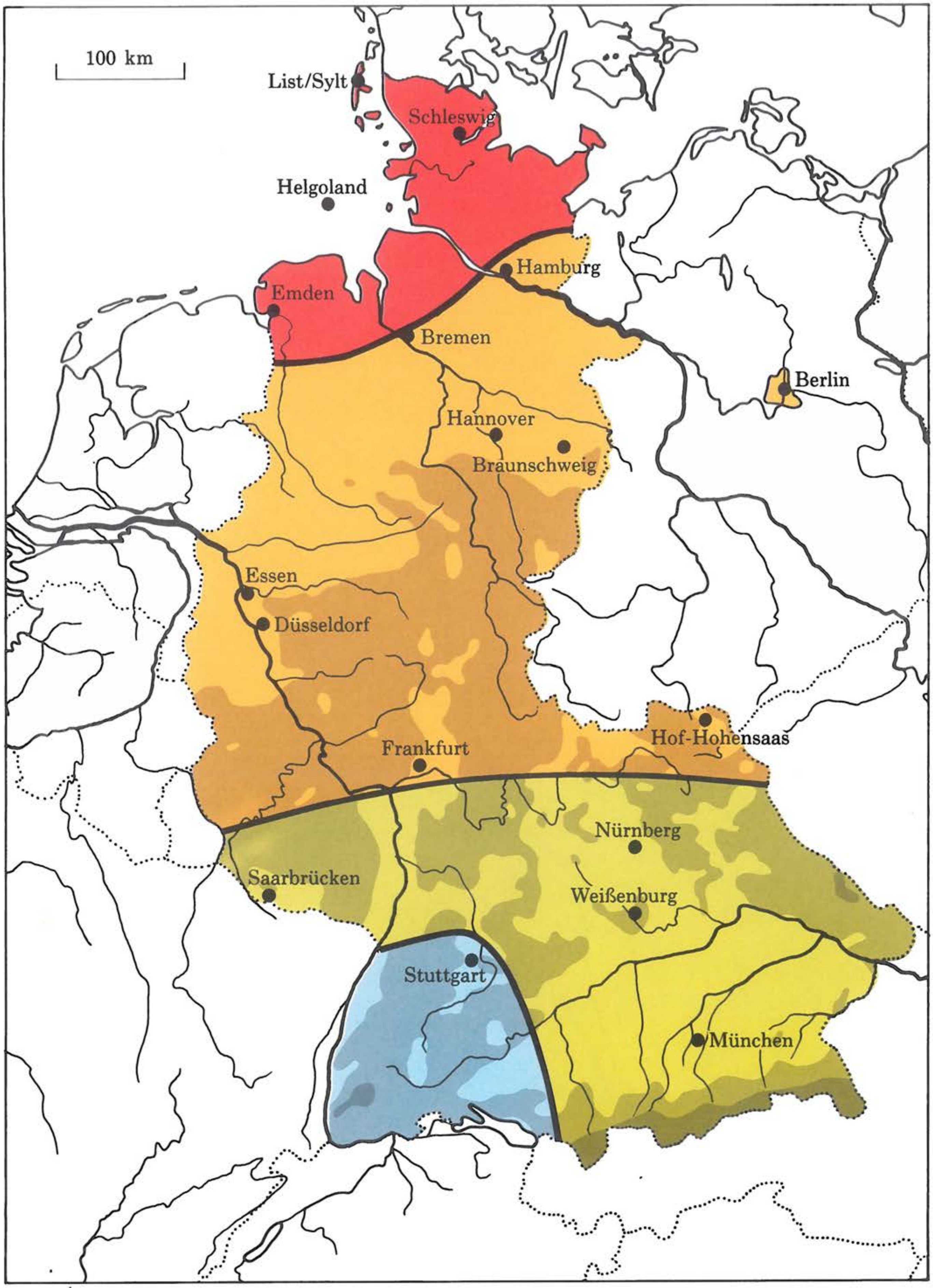
Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			

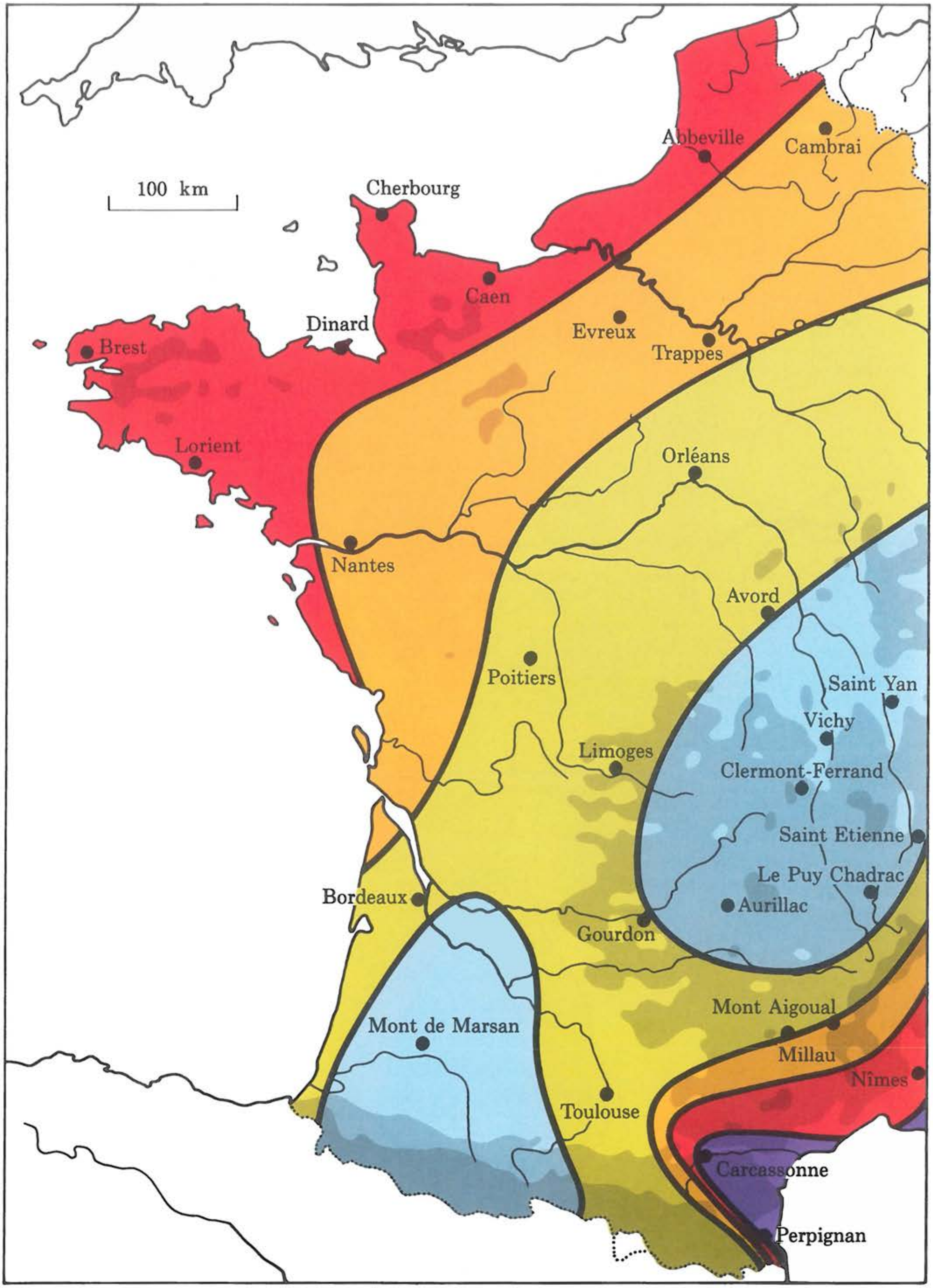


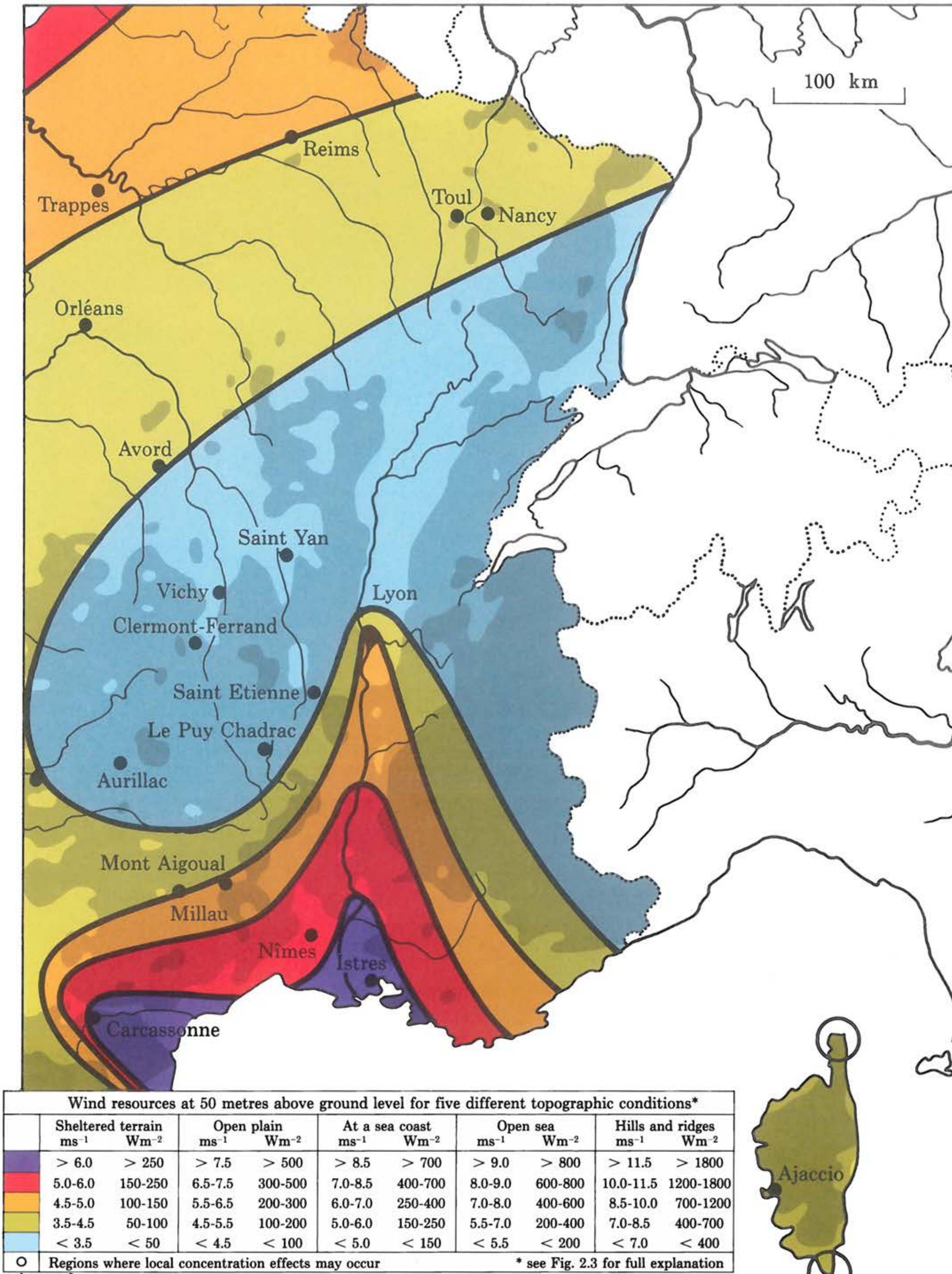
Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
(purple)	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
(red)	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
(orange)	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
(yellow)	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
(light blue)	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			



Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			

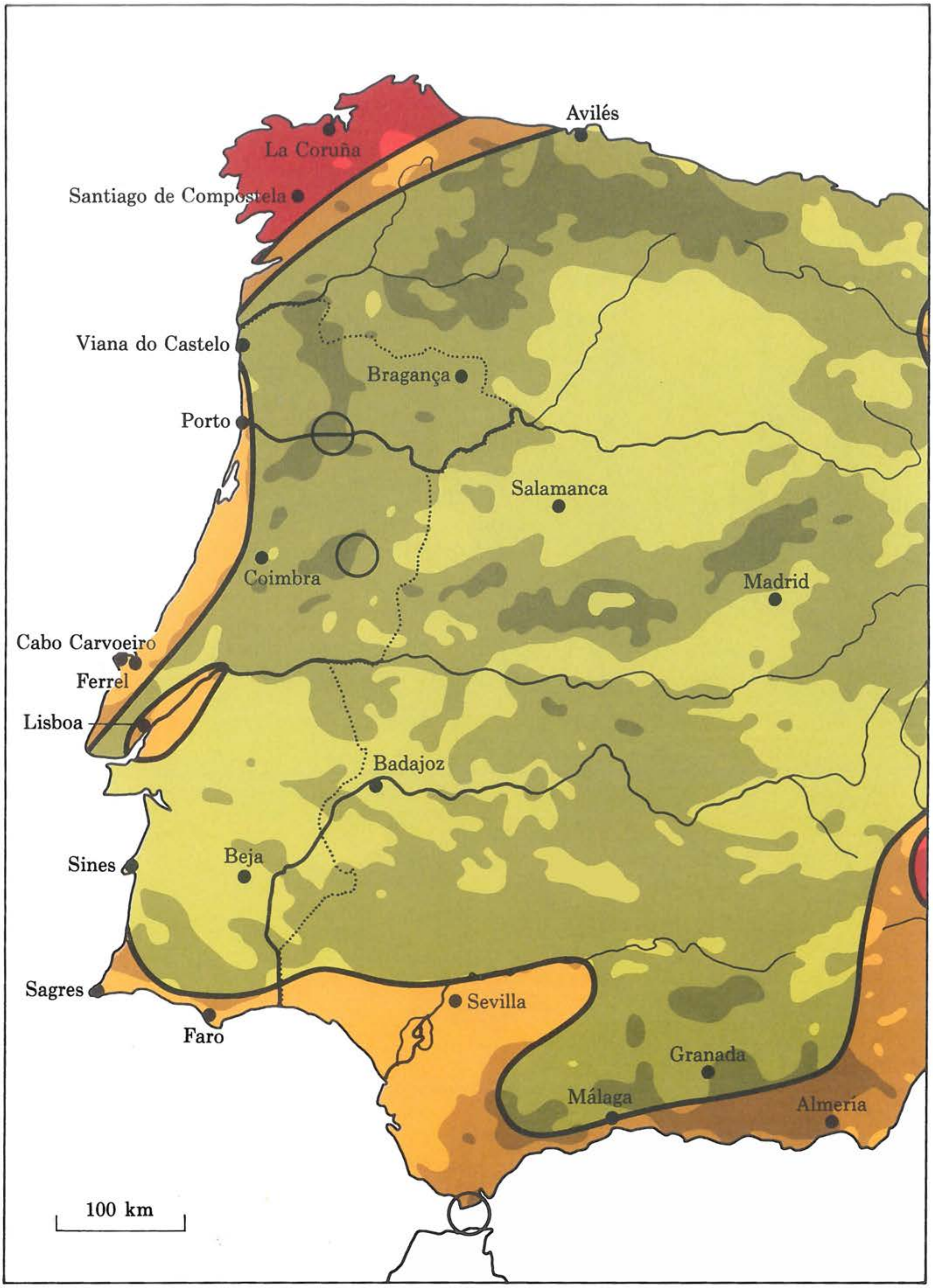

100 km
List/Sylt
Schleswig
Helgoland
Hamburg
Emden
Bremen
Berlin
Hannover
Braunschweig
Essen
Düsseldorf
Hof-Hohensaas
Frankfurt
Nürnberg
Saarbrücken
Weißenburg
Stuttgart
München

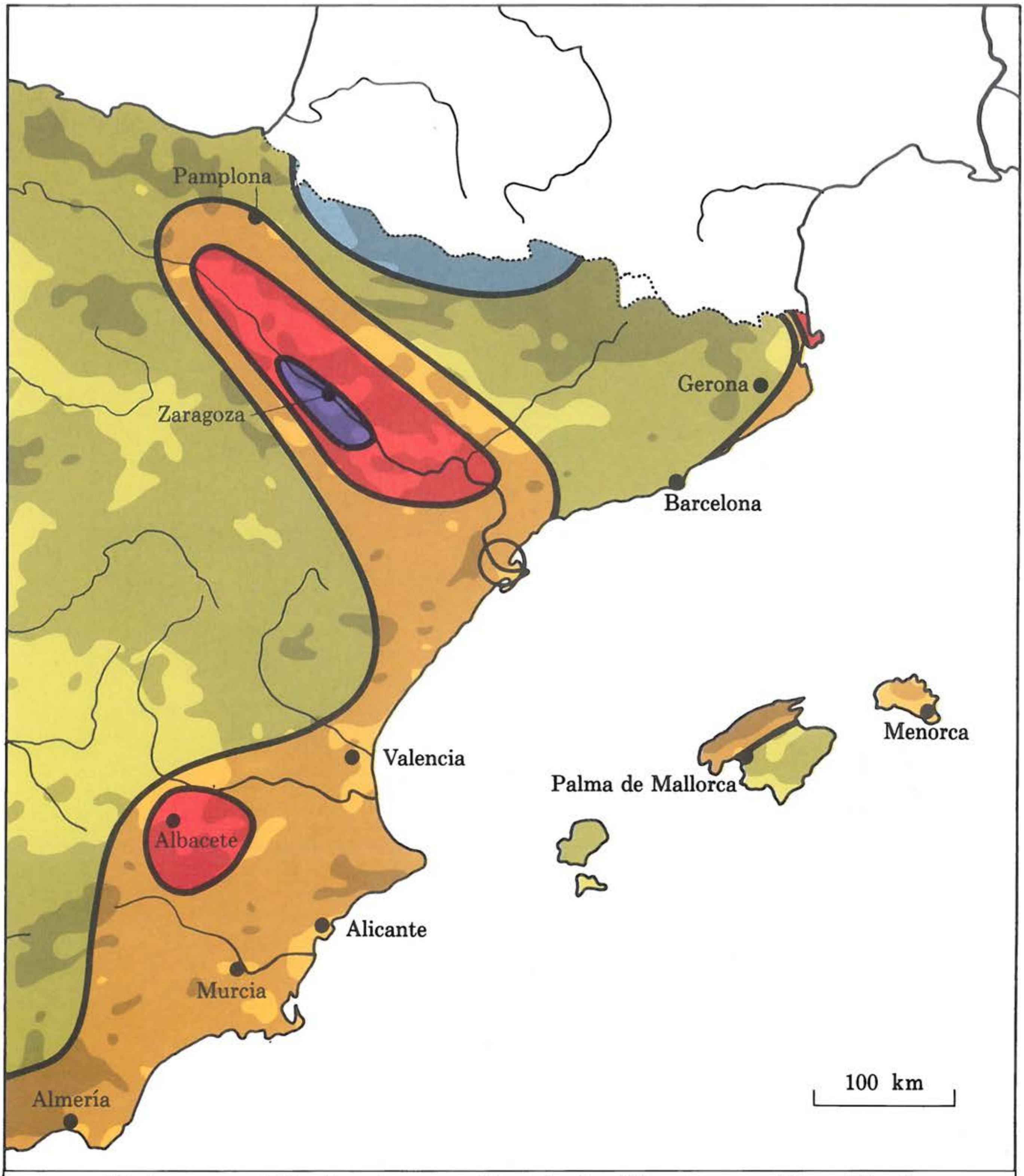

100 km
Cherbourg
Abbeville
Cambrai
Caen
Dinard
Brest
Evreux
Trappes
Lorient
Orléans
Nantes
Avord
Poitiers
Saint Yan
Vichy
Limoges
Clermont-Ferrand
Saint Etienne
Le Puy Chadrac
Bordeaux
Aurillac
Gourdon
Mont Aigoual
Mont de Marsan
Millau
Nîmes
Toulouse
Carcassonne
Perpignan



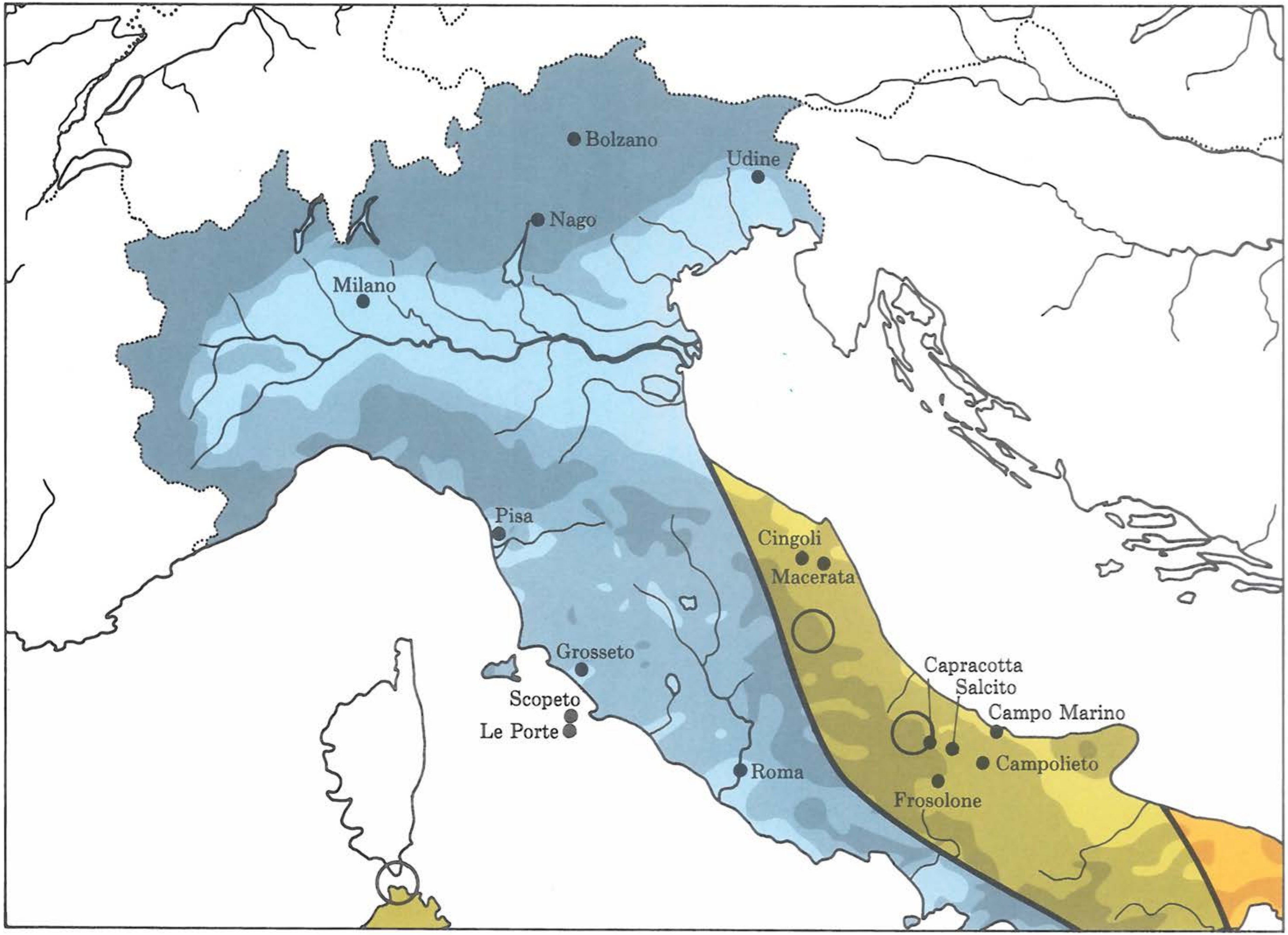
Wind resources at 50 metres above ground level for five different topographic conditions*

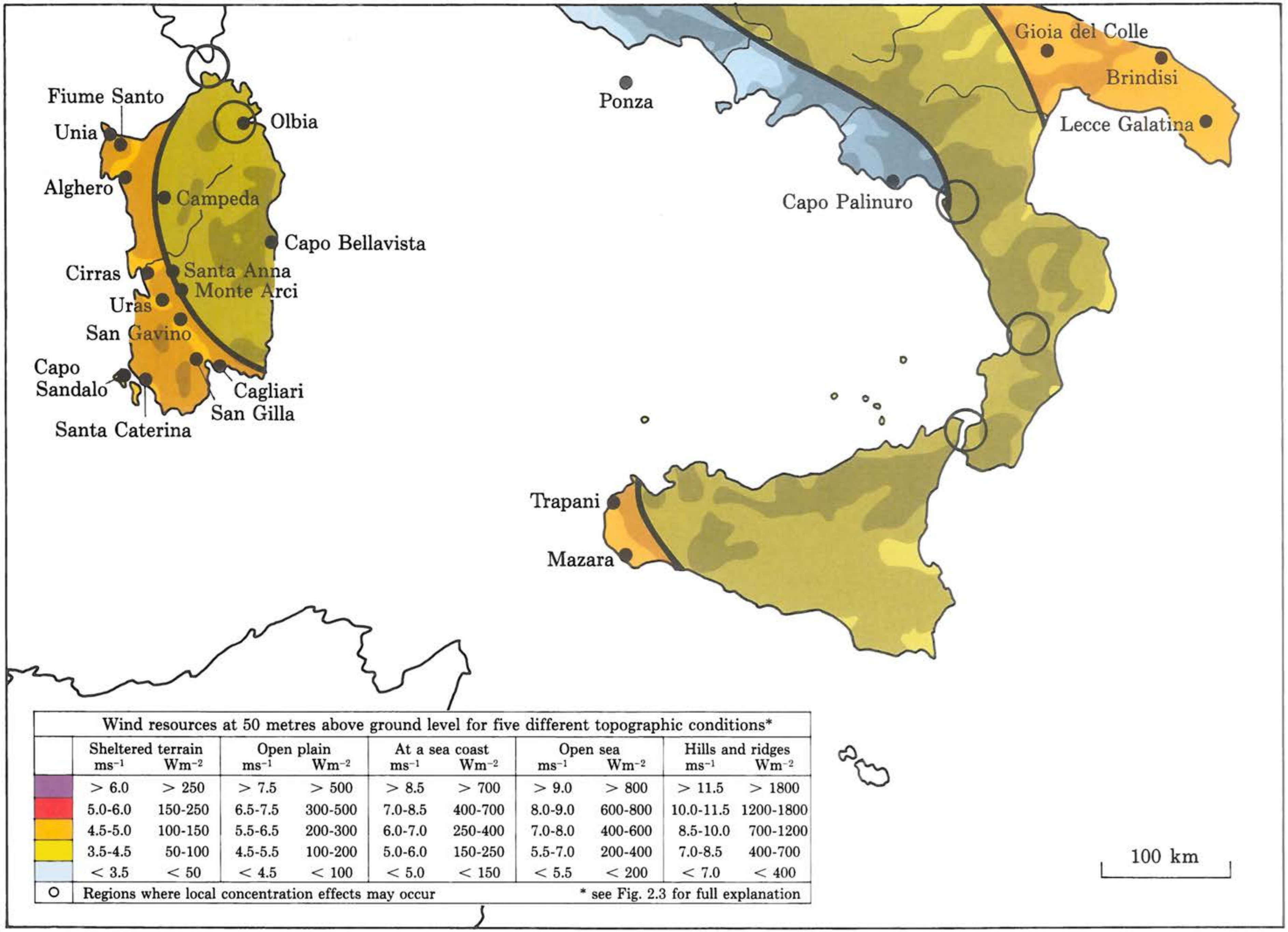
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
○	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			


Avilés
La Coruña
Santiago de Compostela
Viana do Castelo
Bragança
Porto
Salamanca
Coimbra
Madrid
Cabo Carvoeiro
Ferrel
Lisboa
Badajoz
Sines
Beja
Sagres
Sevilla
Faro
Granada
Málaga
Almeria
100 km

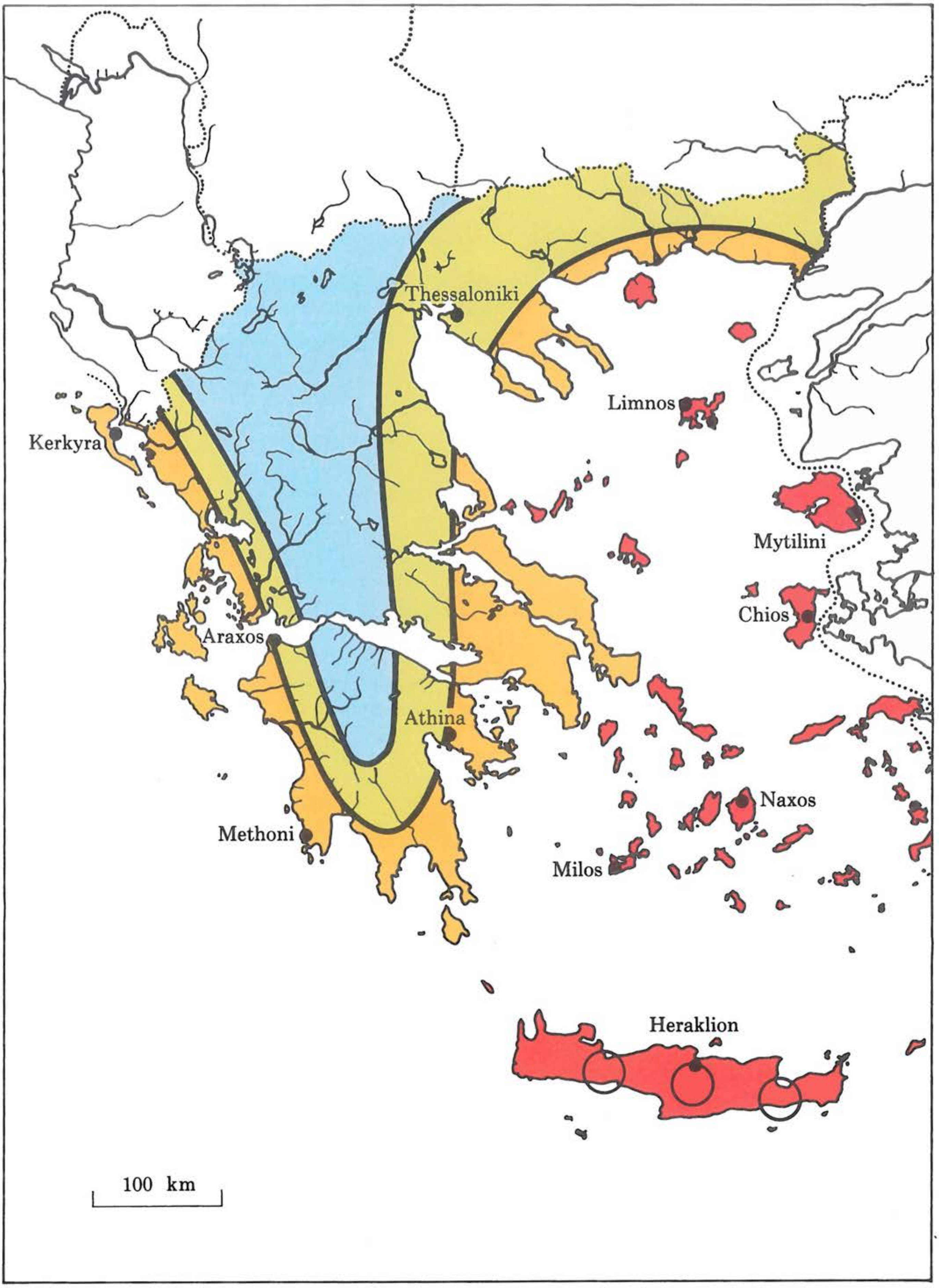


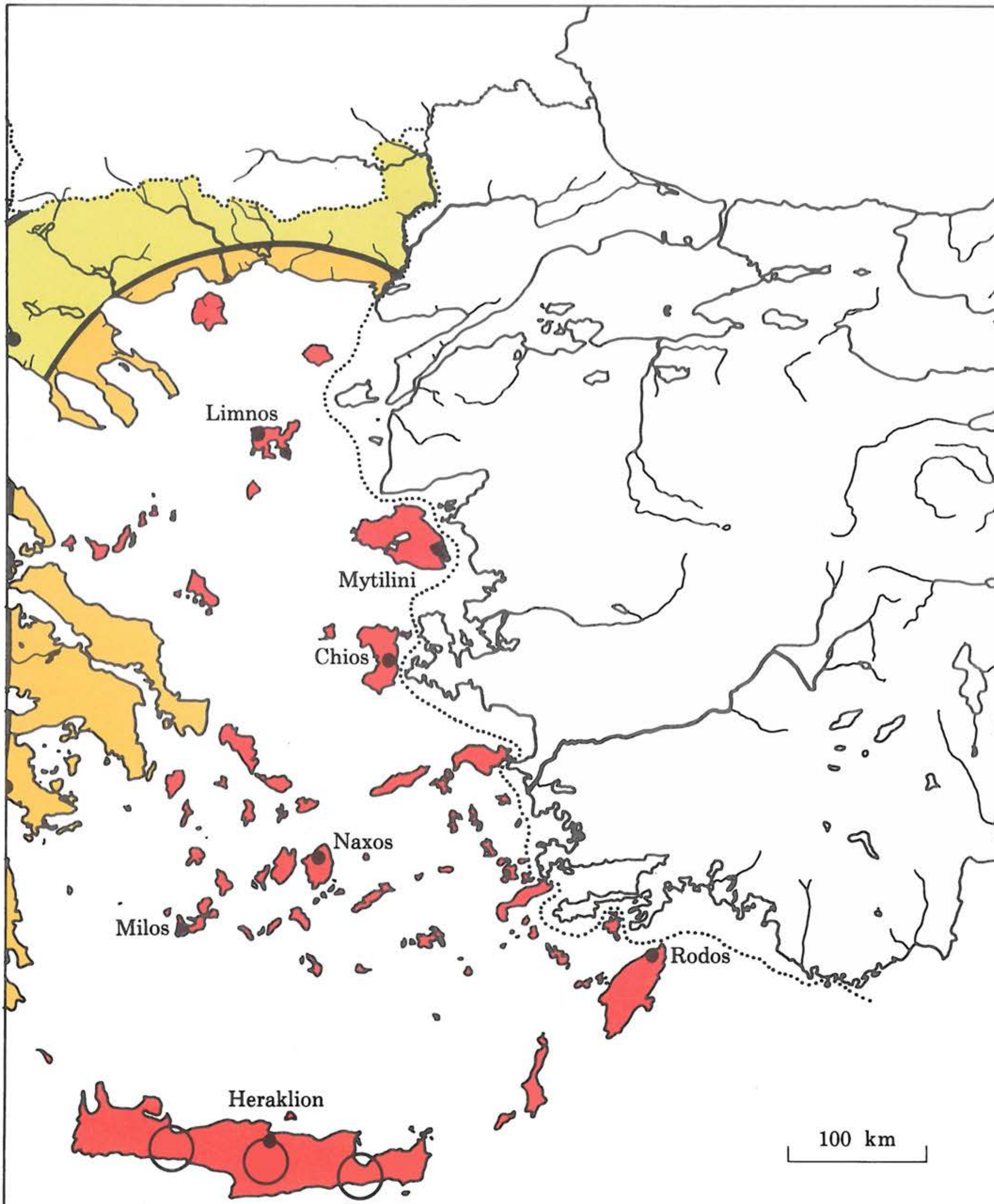
Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			


Bolzano
Udine
Nago
Milano
Pisa
Cingoli
Macerata
Grosseto
Capracotta
Salcito
Campo Marino
Scopeto
Le Porte
Campolieto
Roma
Frosolone



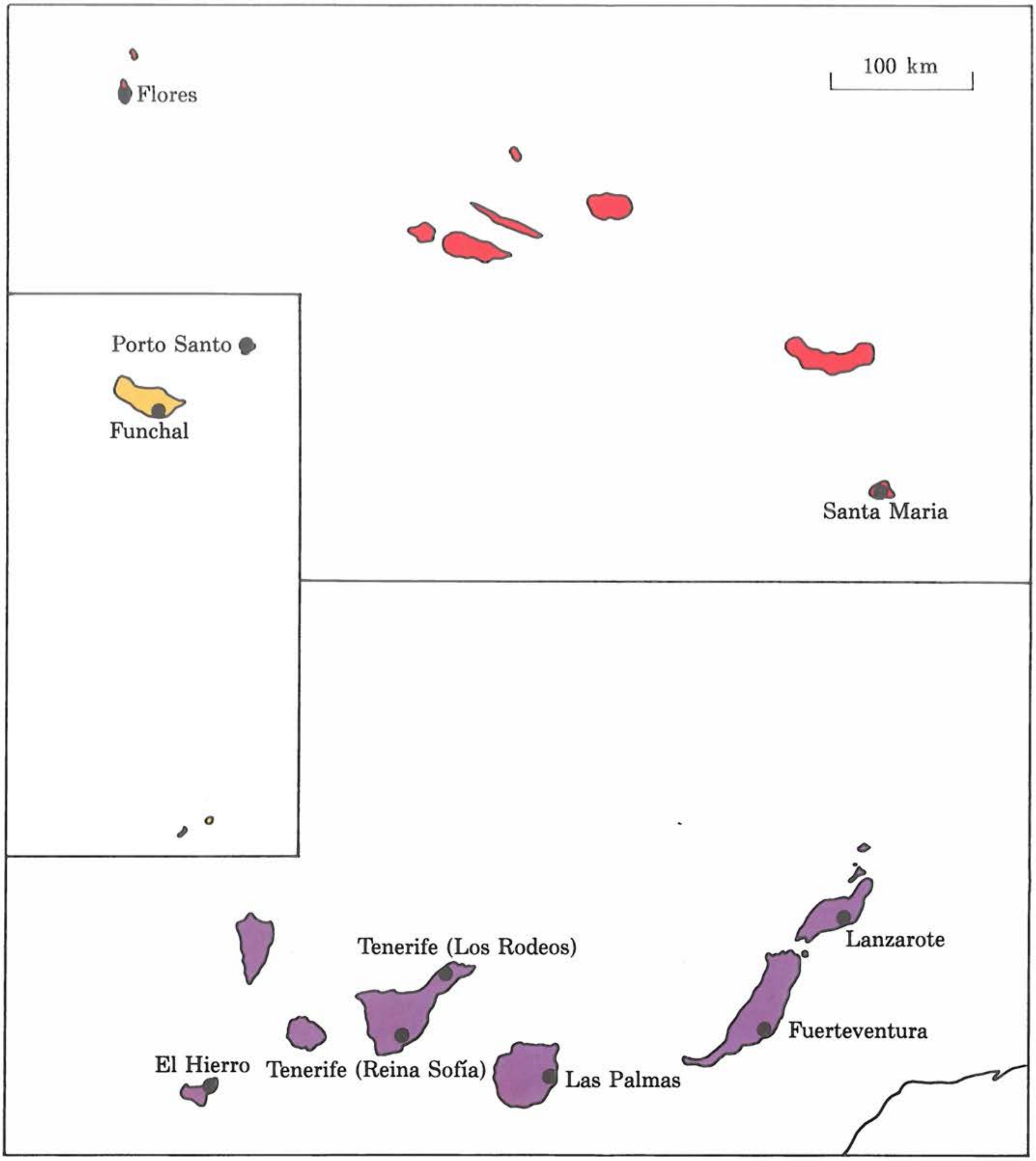
Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain ms⁻¹	Wm⁻²	Open plain ms⁻¹	Wm⁻²	At a sea coast ms⁻¹	Wm⁻²	Open sea ms⁻¹	Wm⁻²	Hills and ridges ms⁻¹	Wm⁻²
(purple)	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
(red)	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
(orange)	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
(yellow)	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
(light blue)	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
○	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			


Thessaloniki
Limnos
Kerkyra
Mytilini
Chios
Araxos
Athina
Naxos
Methoni
Milos
Heraklion
100 km



Wind resources at 50 metres above ground level for five different topographic conditions*

	Sheltered terrain ms^{-1}	Sheltered terrain Wm^{-2}	Open plain ms^{-1}	Open plain Wm^{-2}	At a sea coast ms^{-1}	At a sea coast Wm^{-2}	Open sea ms^{-1}	Open sea Wm^{-2}	Hills and ridges ms^{-1}	Hills and ridges Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			



Wind resources at 50 metres above ground level for five different topographic conditions*										
	Sheltered terrain		Open plain		At a sea coast		Open sea		Hills and ridges	
	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}	ms^{-1}	Wm^{-2}
	> 6.0	> 250	> 7.5	> 500	> 8.5	> 700	> 9.0	> 800	> 11.5	> 1800
	5.0-6.0	150-250	6.5-7.5	300-500	7.0-8.5	400-700	8.0-9.0	600-800	10.0-11.5	1200-1800
	4.5-5.0	100-150	5.5-6.5	200-300	6.0-7.0	250-400	7.0-8.0	400-600	8.5-10.0	700-1200
	3.5-4.5	50-100	4.5-5.5	100-200	5.0-6.0	150-250	5.5-7.0	200-400	7.0-8.5	400-700
	< 3.5	< 50	< 4.5	< 100	< 5.0	< 150	< 5.5	< 200	< 7.0	< 400
o	Regions where local concentration effects may occur						* see Fig. 2.3 for full explanation			

Part II
DETERMINING THE WIND RESOURCE

Chapter 3

General concepts

Estimation of the wind resource ranges from overall estimates of the mean energy content of the wind over a large area - called *regional assessment* - to the prediction of the average yearly energy production of a specific wind turbine at a specific location - called *siting*. The information necessary for siting generally needs to be much more detailed than in the case of regional assessment. However, both applications make use of the general concepts of topography analysis and regional wind climatologies.

In order to calculate the effects of topography on the wind it is necessary to describe systematically the characteristics of the topography.

Close to an obstacle such as a building the wind is strongly influenced by the presence of the obstacle. The effect extends vertically to approximately three times the height of the obstacle, and downstream to 30 to 40 times the height. If the point of interest is inside this zone, it is necessary to take into account the sheltering effects.

The collective effect of the terrain surface and obstacles, leading to an overall retardation of the wind near the ground, is referred to as the roughness of the terrain. Vegetation and houses are examples of topographical elements which contribute to the roughness.

Orographic elements such as hills, cliffs, escarpments and ridges exert an additional influence on the wind. Near the summit or crest of these features the wind will accelerate while near the foot and in valleys it will decelerate.

For a given situation, there are thus three main effects of topography on the wind, namely: shelter, roughness, and orography. Hence, as a general rule, it is necessary to specify the nearby sheltering obstacles, the roughness of the surrounding terrain and orography.

3.1 The roughness of a terrain

The roughness of a particular surface area is determined by the size and distribution of the roughness elements it contains; for land surfaces these are typically vegetation, built-up areas and the soil surface. In the Wind Atlas the different terrains have been divided into four types, each characterized by its roughness elements. Each terrain type is referred to as a *roughness class.* A description and illustration of the four roughness classes has been given in Figs. 1.2-1.5.

The roughness length

The roughness of a terrain is commonly parameterized by a length scale called the roughness length z_0.

A simple empirical relation between the roughness elements and the roughness length has been given by Lettau (1969). A roughness element is characterized by its height h and the cross-section facing the wind S. Further, for a number of roughness elements distributed evenly over an area, the density can be described by the average horizontal area, A_H, available to each element. Then

$$z_0 = 0.5 \cdot \frac{h \cdot S}{A_H} \tag{3.1}$$

This relation gives reasonable estimates of z_0 when A_H is much larger than S. It tends to overestimate z_0 when A_H is of the order of S; this is because, when the roughness elements are close together, the flow is "lifted" over them. Then only a fraction of S and h contributes to the roughness. Furthermore, the lifting of the flow requires measuring the height above ground from somewhere between the top of the roughness elements and half the height of the elements. This height is referred to as a *displacement length.* The displacement length must often be taken into account on sites with forests, cities, and tall vegetation. Finally, Eq. 3.1 assumes that the porosity is approximately zero, i.e. the roughness elements are solid. For porous roughness elements, z_0 from Eq. 3.1 must be reduced by a fraction equal to the porosity.

Example 3.1 Equation 3.1 can be applied to calculate the roughness length of a terrain with a large number of houses (e.g. a provincial town). The roughness is estimated from h = 5 m, S = 100 m^2 and A_H = 1000 m^2:

$$z_0 = 0.5 \cdot 5 \cdot \frac{100}{1000} = 0.25 \text{ m}$$

The empirical relation may also be applied to windbreaks (shelter belts) by letting $S \sim hL$ and $A_H \sim l\, L$, where L is the length of windbreak and l the distance between windbreaks. Hence, Eq. 3.1 becomes:

$$z_0 = 0.5 \cdot \frac{h^2}{l} \tag{3.2}$$

For a typical height of 10 m, the influence of l on z_0 can be illustrated by the following table:

l	[m]	1000	500	200
z_0	[m]	0.05	0.1	0.25

It should be noted that the porosity was assumed to be zero in the above calculation. For windbreaks of trees and bushes, the porosity is approximately 0.5, which leads to a decrease in the distance l between the windbreaks by a factor of two in order to give the same roughness.

Figure 3.1 indicates the relation between roughness length, terrain characteristics, and roughness class. The roughness length of surfaces covered by vegetation may vary with the wind speed. For example, the bending of stalks by the wind can change the form of the surface. A similar phenomenon occurs for water waves where both the height and form of the waves are dependent on wind speed. From dimensional arguments, the following equation can be obtained for the roughness over water when viscous effects and the surface tension of the water are neglected (Charnock, 1955):

$$z_0 = b\,\frac{u_*^2}{g} \tag{3.3}$$

where b is a constant ($b \sim 0.014$), g the gravitational acceleration, and u_* the friction velocity (see Eq. 8.2).

In the Wind Atlas it has been attempted to use both Eq. 3.3 and a fixed value for the roughness of water areas, roughness class 0. It turned out that a fixed value of 0.0002 m gave results as good as Eq. 3.3 for the moderate to high wind speeds of interest to the Wind Atlas, hence all statistics in the Wind Atlas are obtained with this value.

It should be noted that in general the roughness length as applied in the Wind Atlas has to be considered as a climatological parameter because the roughness of an area changes with foliation, vegetation, snow cover and so on. The energy production of a wind turbine must be determined on the basis of climatology, primarily because of the variations of the weather; however, the seasonal variations in the local terrain characteristics can also have a profound influence.

z_0 [m]	Terrain surface characteristics	Roughness class
1.00	city	
	forest	
0.50	suburbs	
		3
0.30	shelter belts	
0.20	many trees and/or bushes	
0.10	farmland with closed appearance	2
0.05	farmland with open appearance	
0.03	farmland with very few buildings, trees *etc.*	1
	airport areas with buildings and trees	
0.01	airport runway areas	
	mown grass	
$5 \cdot 10^{-3}$	bare soil (smooth)	
10^{-3}	snow surfaces (smooth)	
$3 \cdot 10^{-4}$	sand surfaces (smooth)	
		0
10^{-4}	water areas (lakes, fjords, open sea)	

Figure 3.1: Roughness length, surface characteristics and roughness class. The roughness classes are indicated by vertical bars. The central points give the reference values and the length of the bars indicates the typical range of uncertainty in roughness assessments.

3.2 Shelter behind obstacles

Shelter is defined as the relative decrease in wind speed caused by an obstacle in the terrain. Whether an obstacle provides shelter at the specific site depends upon:

- the distance from the obstacle to the site (x)
- the height of the obstacle (h)
- the height of the point of interest at the site (H)
- the length of the obstacle (L)
- the porosity of the obstacle (P)

Figure 3.2 shows the reduction of wind speed due to shelter from an infinitely long two-dimensional obstacle of zero porosity. The shelter decreases with diminishing length and increasing porosity of the obstacle.

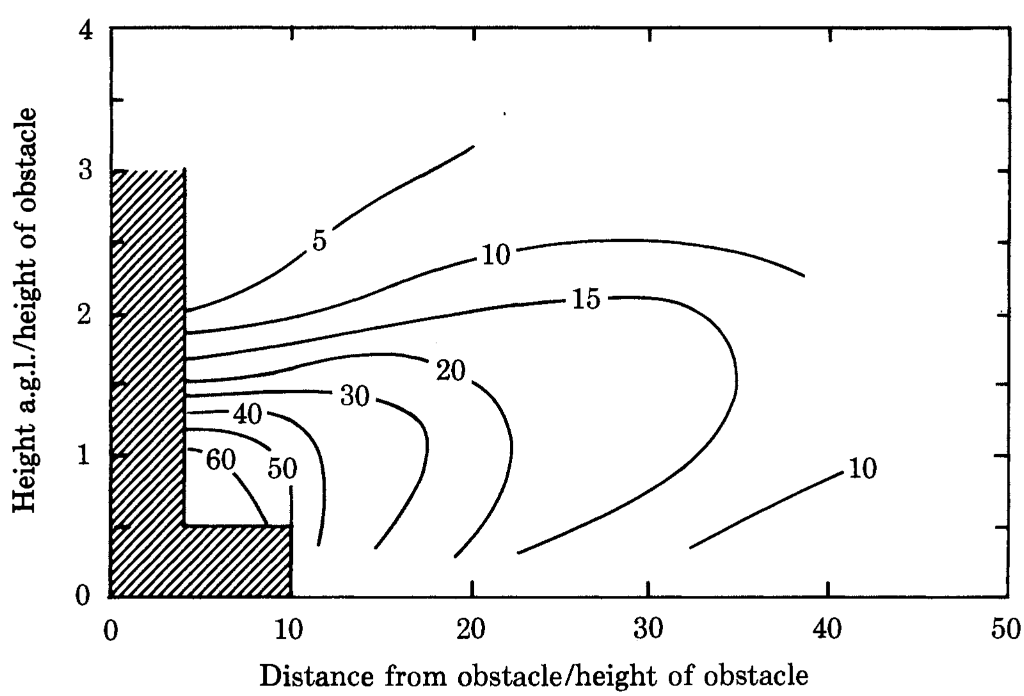


Figure 3.2: Reduction of wind speed (R_1) in per cent due to shelter by a two-dimensional obstacle based on the expressions given by Perera (1981). In the shaded area the sheltering is very dependent on the detailed geometry of the obstacle. In addition, wind speed is usually increased close to and above the obstacle – similar to the speed-up effects over hills.

As a general rule, the porosity can be set equal to zero for buildings and ≈ 0.5 for trees. A row of similar buildings with a separation between them of one third the length of a building will have a porosity of about 0.33. For windbreaks the characteristics listed in Table 3.1 may be applied. The porosity of trees changes with foliation, i.e. the time of year and like the roughness length, the porosity should be considered a climatological parameter.

Table 3.1: Porosity of windbreaks.

Appearance	Porosity P
Solid (wall)	0
Very dense	≤ 0.35
Dense	0.35 - 0.50
Open	≥ 0.50

The effect of porosity, P ($0 \leq P \leq 1$) is approximately accounted for by multiplication by ($1 - P$). Another consideration relevant to the correction of wind data is the lateral dimension L of the obstacle. Most empirical data, including the data in Perera (1981), are concerned with two-dimensional fences or shelter belts corresponding to "infinite" lateral dimensions. The shelter from obstacles with finite lateral dimensions is decreased because of lateral mixing in the wake; furthermore, the effect on the average wind speed in a given azimuth sector is decreased because of the finite angular dimension of the obstacle as seen from the site. In a given 30° sector the reduction in average wind speed (R_2) can be approximately estimated by reducing the shelter obtained from Fig. 3.2, using the following expressions derived from simple geometrical considerations:

$$R_2 = \begin{cases} \left(1 + 0.2\,\dfrac{x}{L}\right)^{-1} & \text{for } \dfrac{L}{x} \geq 0.3 \\[2ex] 2\dfrac{L}{x} & \text{for } \dfrac{L}{x} \leq 0.3 \end{cases} \tag{3.4}$$

Hence

$$u_{cor} = u \cdot \left(1 - R_2 \cdot R_1\,(1 - P)\right) \tag{3.5}$$

where u_{cor} and u are the mean wind speeds corresponding to sheltered and unsheltered conditions, respectively, and $R_1 = \Delta u/u$ is the fractional wind speed reduction from Fig. 3.2.

3.3 The effect of height variations in the terrain

The effects of height variations in the terrain on the wind profile can most clearly be demonstrated by the results from the international field experiments at the Askervein hill on the Isle of South Uist in the Hebrides (Taylor and Teunissen, 1987; Salmon et al., 1987). Figure 3.3 shows a perspective plot of the Askervein hill. The line along which measurements of wind speed and direction were recorded is indicated by the meteorological towers.

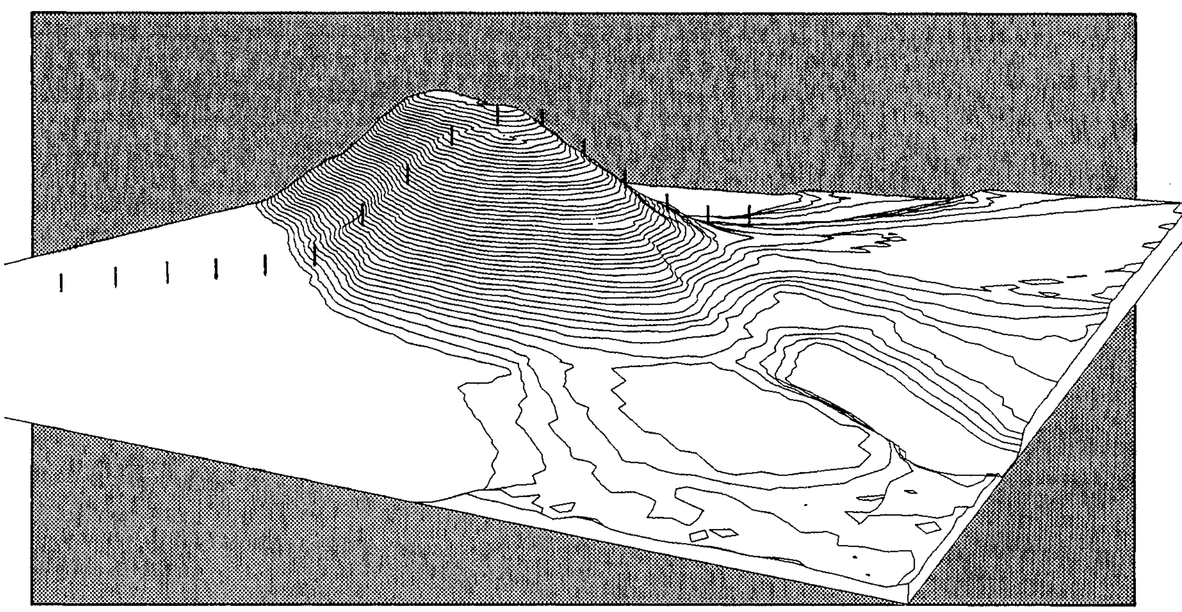


Figure 3.3: Perspective plot of the Askervein hill.

The experimental data are shown in Fig. 3.4 with the relative speed-up ΔS at 10 m a.g.l. plotted against the distance from the crest. The relative speed-up ΔS is defined as:

$$\Delta S = \frac{u_2 - u_1}{u_1} \tag{3.6}$$

where u_2 and u_1 are the wind speeds at the same height above ground level at the top of the hill and over the terrain upstream of the hill, respectively.

The data in Fig. 3.4 are obtained for a wind direction almost perpendicular to the orientation of the ridge. Also shown are the results from three numerical models: the BZ-model used in the Wind Atlas analysis and two other models (Beljaars et al., 1987). Some noteworthy characteristics from Fig. 3.4 are:

- the speed-up at the crest is 80 per cent as compared with the undisturbed upstream mean wind speed
- the negative speed-up (speed-down) in the front and lee of the hill is 20 to 40 per cent as compared with the undisturbed upstream mean wind speed.

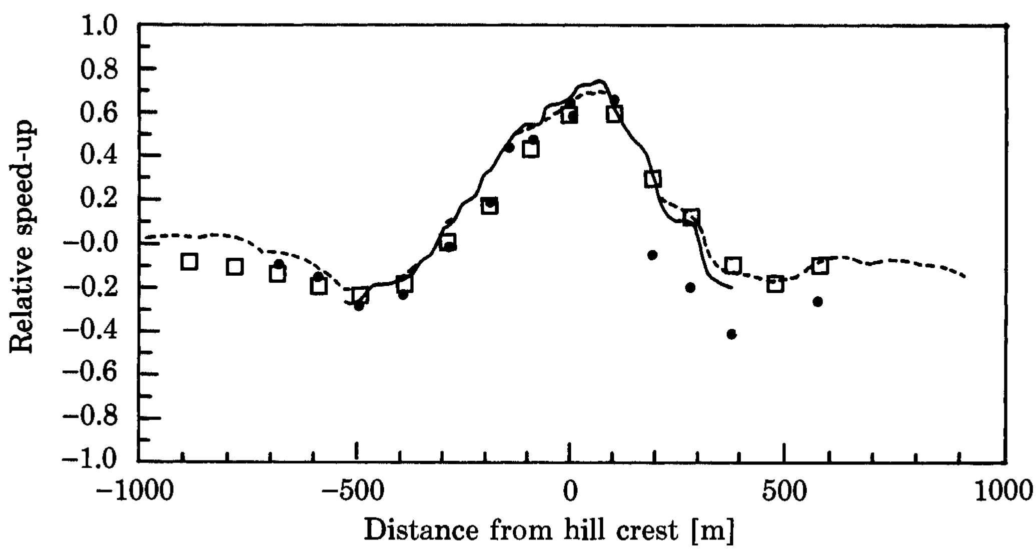


Figure 3.4: Relative speed-up ratios for flow over the Askervein hill at 10 m above ground level. Measurements are indicated by dots and results from the orographic model by squares. Results from two other numerical models are shown by a full and dashed line, respectively.

Figure 3.5 shows wind profiles recorded simultaneously upstream and on top of the Askervein hill. Note that the upstream profile is logarithmic with height whereas the hill-top profile has a knee at the height l, the height of maximum relative speed-up. The profile is constant with height above the knee until it matches with the upstream profile at the height $2L$ where L is a characteristic length of the hill, typically the half-width as shown in Fig. 3.6. Approximate expressions for ΔS and l can be found in Jensen et al. (1984):

$$\Delta S \simeq 2\frac{h}{L} \tag{3.7}$$

$$l \simeq 0.3 \cdot z_0 \left(\frac{L}{z_0}\right)^{0.67} \tag{3.8}$$

These formulas often work well when the dimension of the hill perpendicular to the wind direction is much larger than L, so the problem can be considered to be two-dimensional.

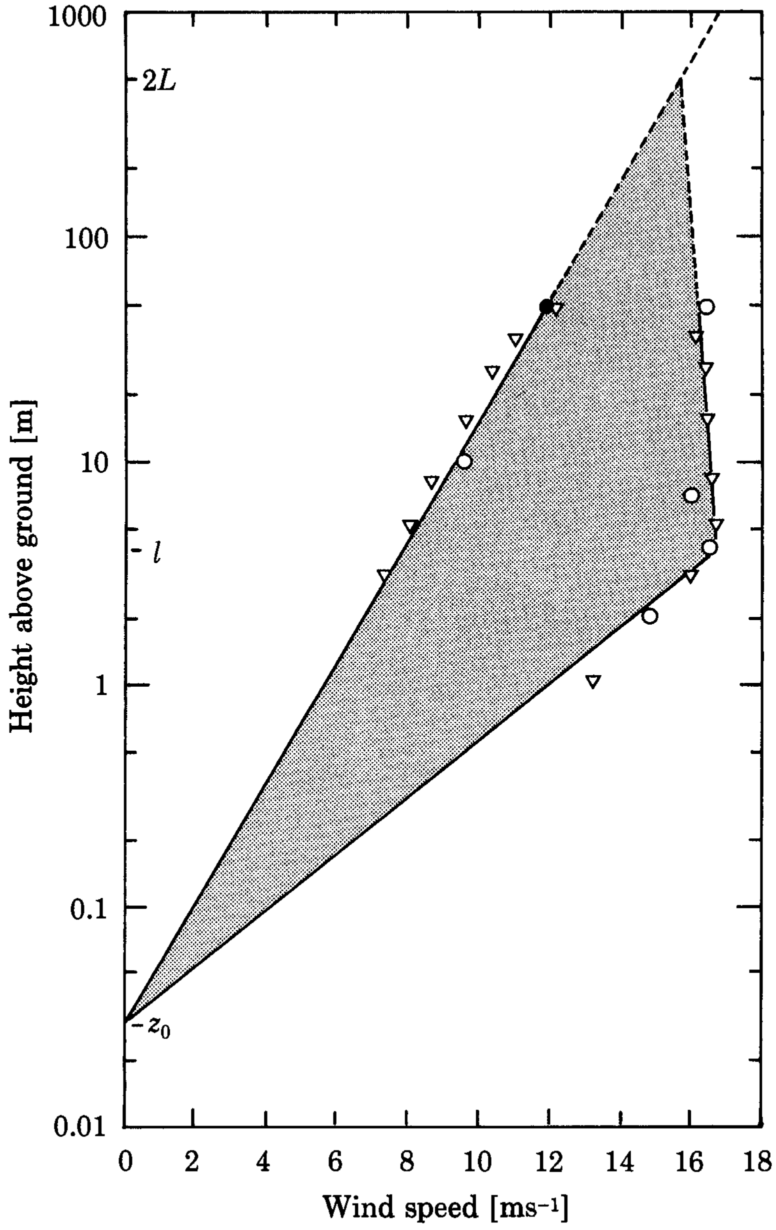


Figure 3.5: Wind profiles recorded simultaneously upstream and on top of the Askervein hill (Jensen et al., 1984). The symbols indicate wind speed measurements. Upstream profile is the straight line to the left; hill-top profile is the line to the right. The two length scales L and l are defined in Fig. 3.6.

It is evident from the above example that hills exert a profound influence on the flow, and this has to be taken into account as carefully as possible. But one should be aware that all the height changes in the terrain influence the flow: a 5% height increase can have a 5% impact on the mean wind speed - possibly at hub height - resulting in a 15% increase of the available power. It is often difficult - and impossible in complicated terrain - to apply simple formulas such as Eqs. 3.7 and 3.8 to determine the wind resource at specific locations. For this reason it is necessary in most cases to use a numerical model for the calculations.

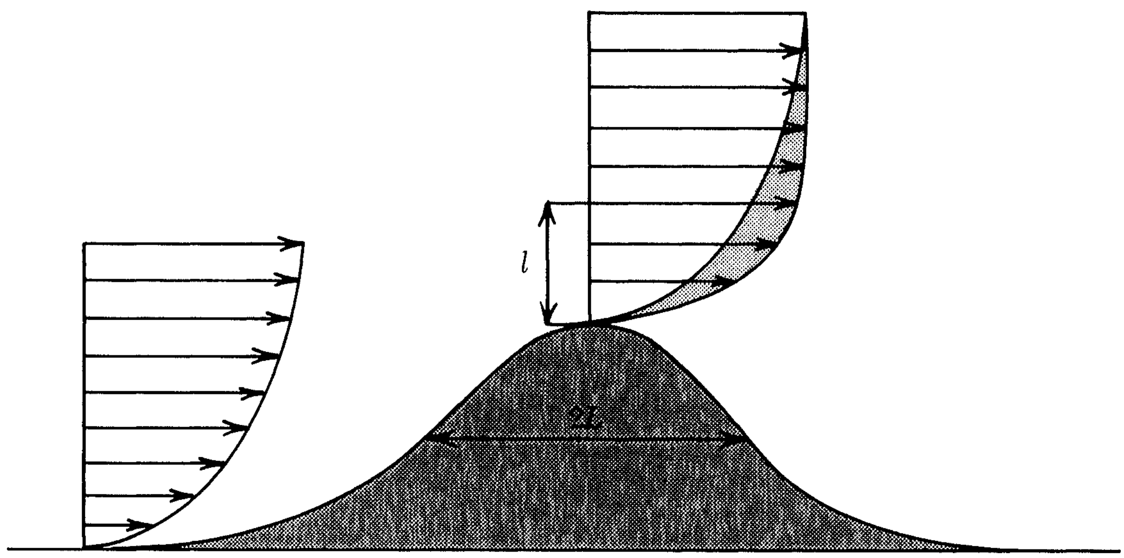


Figure 3.6: Flow over an idealized hill with upstream and hill-top wind profiles. The two length scales characterizing the flow are indicated: L is a characteristic length of the hill, here – following traditional nomenclature – the half width at the middle of the hill; l is the height of maximum relative speed-up.

An example is the Portuguese station Bragança, shown in a perspective plot of the orography in Fig. 3.7. The changes in the wind profile in each direction sector are given in Table 3.2 and were calculated by the orographic model of the Atlas, described in Chapter 8.

In certain situations the precise meaning of "height above the ground" is not evident. As an example, consider a wind turbine on a low hill: if the height of the hill is very small compared to the hub height and the sides slope steeply, the hill can be considered as a foundation for the turbine which adds to the hub height. But if the lateral and vertical dimensions of the hill are increased, the situation changes and the relevant height becomes the height above the hill top.

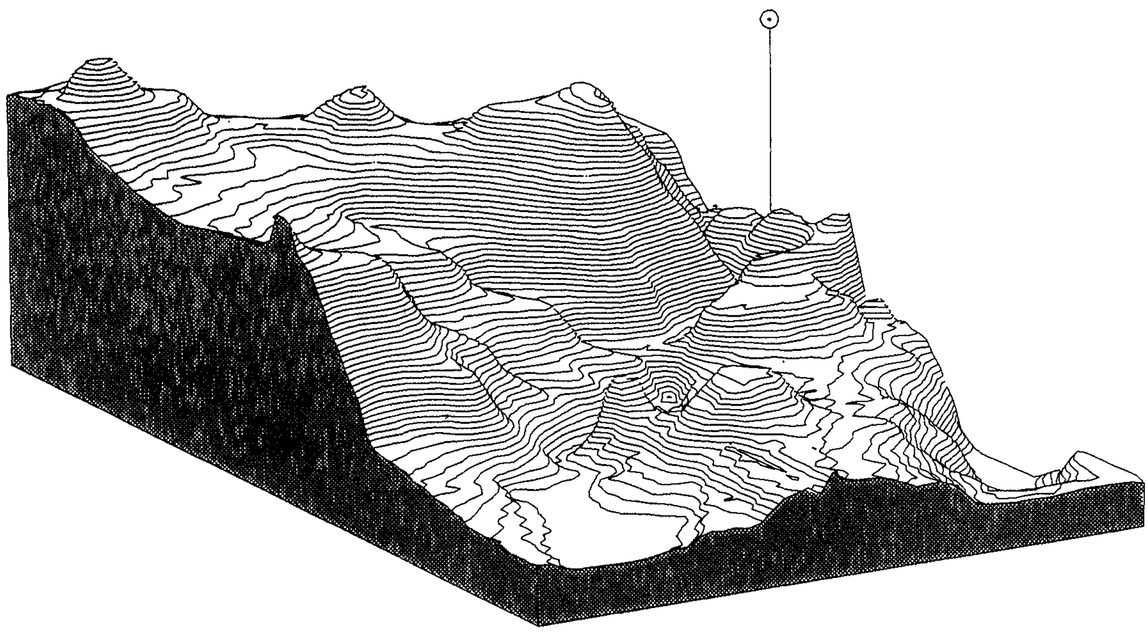


Figure 3.7: Perspective plot of the orographical setting of the Portuguese station Bragança.

	Sector											
z	0	30	60	90	120	150	180	210	240	270	300	330
10	120	75	21	27	84	124	120	75	21	29	90	124
	-8	-19	-11	14	18	6	-8	-19	-11	15	19	6
25	68	35	8	14	47	71	68	39	8	14	49	71
	-7	-14	-6	10	13	4	-7	-14	-6	10	13	4
50	42	22	3	7	29	45	42	22	3	7	29	45
	-5	-10	-4	7	9	3	-5	-10	-4	7	10	3
100	22	9	0	2	15	20	22	9	0	2	15	25
	-4	-6	-2	5	6	1	-4	-6	-2	5	6	1
200	8	1	-2	0	7	10	8	1	-2	0	7	10
	-2	-3	0	3	3	0	-2	-3	0	3	3	0

Table 3.2: Model results for Bragança obtained with the orographic model. For each sector and the five standard heights the table gives the over- or underspeeding in per cent (first line) as well as the change of wind direction in degrees (second line).

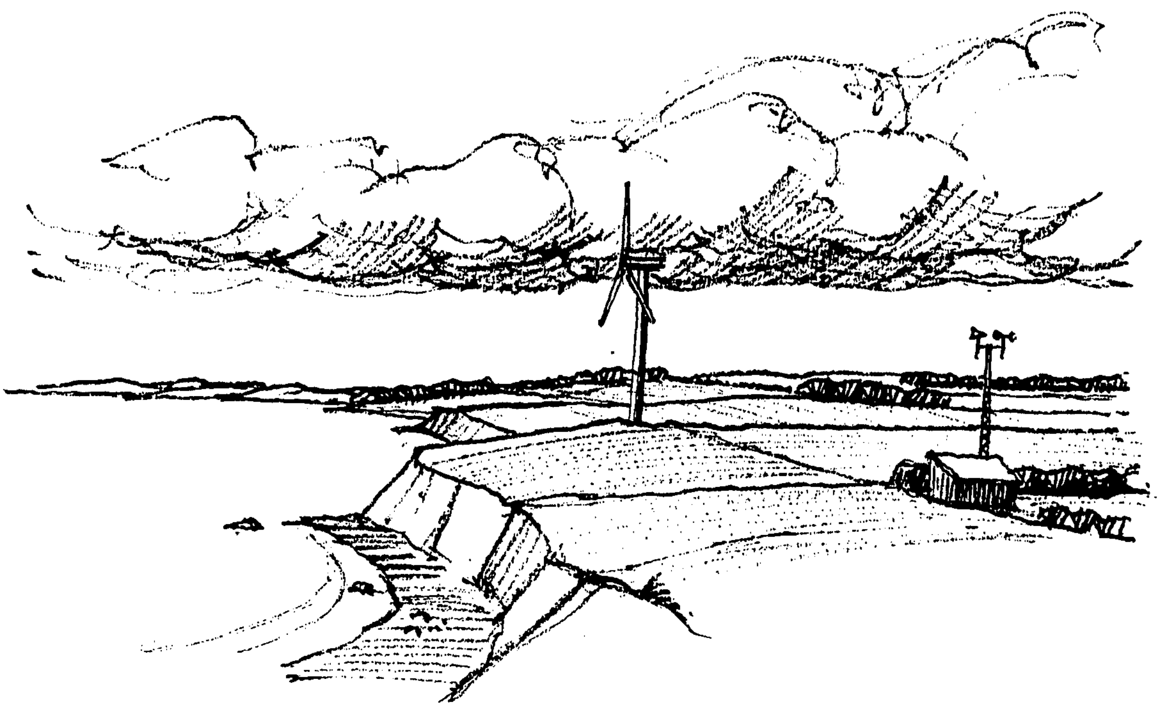


Figure 3.8: A wind turbine at an escarpment.

Another example is shown in Fig. 3.8 where a wind turbine is built close to an escarpment. For winds coming from the sea one might be tempted to use the height from the water surface to the hub. But this is quite wrong because the wind has been influenced by the cliff long before it hits land, and the relevant height is therefore the height above ground.

Chapter 4

Regional wind energy potential

Regional assessment of wind energy resources means estimating the potential output from a large number of wind turbines distributed over the region. Such investigations can be carried out with different levels of sophistication. Ideally, an exercise should be based on the detailed siting of a large number of specific installations.

An example of a very detailed assessment study is shown in Fig. 4.1. The objective was to investigate how many 50-m wind turbines could be installed in Denmark. The classification was noted in 100 maps on a scale of 1:50 000 covering the entire country. Apart from the overall goal, the maps have been used to identify sites for single wind turbines as well as wind farms.

Obviously, the preparation of detailed roughness classification maps such as that shown in Fig. 4.1 is an enormous task when large regions are concerned. Therefore, local details must usually be disregarded in the presentation of regional wind resources.

4.1 Use of the wind resource maps

The wind resource maps in Chapter 2 show the variation of the wind resources over large homogeneous areas. In relatively uncomplicated areas, the maps can be used in combination with the table in Fig. 2.3 for regional resource assessment and mean-energy production calculations for single turbines.

The maps together with the legend give the mean wind speed and mean power density at a height of 50 metres for five different topographical conditions. By means of Figs. 4.2 and 4.3 it is possible to estimate the mean wind speed and the mean power density at heights between 10 and 200 metres over homogeneous terrain of each of the four roughness classes. The figures give the conversion factors f_u and f_E for the mean wind speed and the mean power, respectively. These factors are to be multiplied by the values read from Fig. 2.3 in the column corresponding to roughness class 1 (Open plain). The following two examples demonstrate the procedure.

Figure 4.1: Example of a roughness classification map with marked shelter belts, groups of trees, farms, villages, and plantations. The map covers an area of approximately 22 × 28 km (Planstyrelsen, 1981).

Example 4.1 Figure 2.3 gives a mean power density $E(50)$ of approximately 300 $\mathrm{Wm^{-2}}$ over a wide open plain in northern Germany. If one wishes to estimate the power density at a height of 40 m, Fig. 4.2 gives the conversion factor 0.9, hence the power density at 40 m becomes $\sim$ 270 $\mathrm{Wm^{-2}}$.

Example 4.2 The wind resource map of Ireland shows a mean power density of approximately 500 $\mathrm{Wm^{-2}}$ over a terrain of roughness class 1. The power available for a 50-m wind turbine with a rotor diameter of 50 m is then 500 $\mathrm{Wm^{-2}}$ × rotor swept area $\simeq$ 980 kW, corresponding to approximately 8.6 GWh/year.

However, a wind turbine cannot utilize all the energy in the wind. Aerodynamic considerations give a theoretical maximum efficiency of 59 per cent conversion, usually referred to as the *Betz limit* (Betz, 1920). In practice, only about 20-30 per cent of the available power can be converted; a reasonable value for rule-of-thumb estimations is 25 per cent. Hence, the mean energy production is estimated to be of the order of 2.2 GWh per year.

When the maps are used in coastal zones and mountainous areas, the special considerations described below apply.

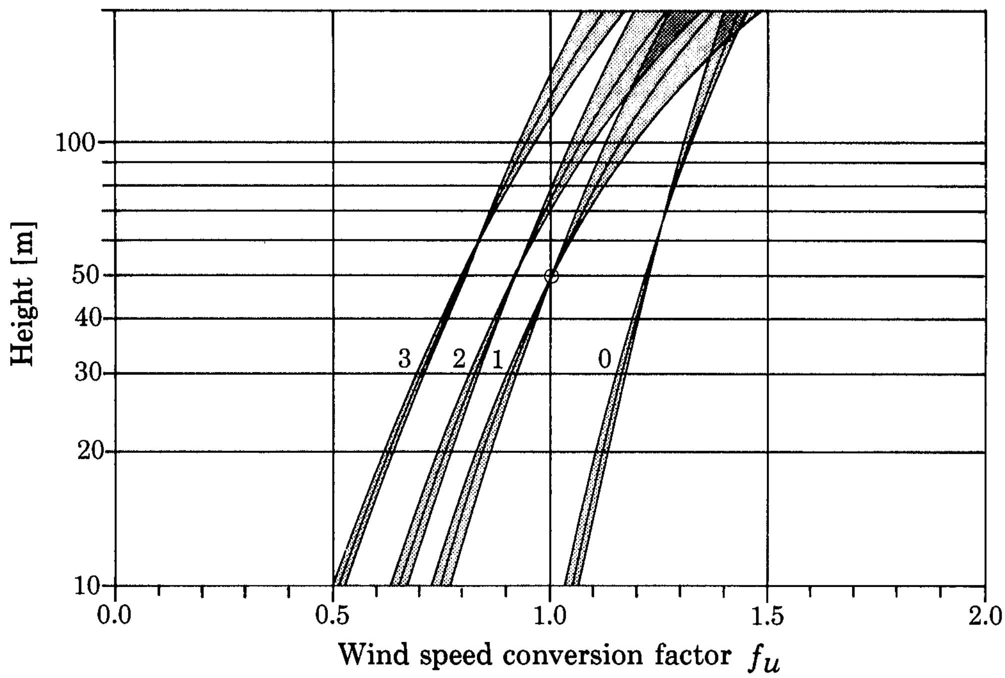


Figure 4.2: Mean wind speed conversion factors, f_u. For use in combination with the wind resource maps of Chapter 2 to estimate the mean wind speed at heights between 10 and 200 metres over homogeneous terrain of one of the four roughness classes. The reference value (50 metres, roughness class 1) is indicated by a circle. The shading indicates the uncertainty due to climatic differences over Europe.

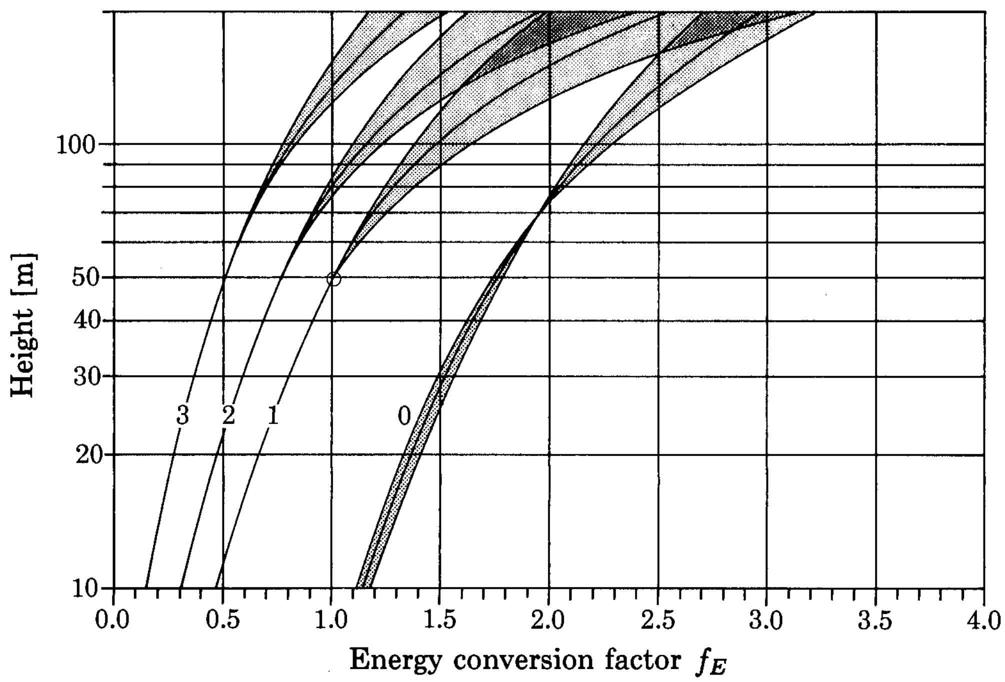


Figure 4.3: Mean energy conversion factors, f_E. For use in combination with the wind resource maps of Chapter 2 to estimate the mean power density at heights between 10 and 200 metres over homogeneous terrain of one of the four roughness classes. The reference value (50 metres, roughness class 1) is indicated by a circle. The shading indicates the uncertainty due to climatic differences over Europe.

Coastal zones

When the air moves from sea to land areas or vice versa, two effects are of major importance for wind resource climatologies, namely: the change of surface roughness and thermal surface properties. Well away from the coast, the wind climate is either of the maritime or inland type, but in between it is a mixture. The width of the coastal zone varies with climate and topography. The Wind Atlas assumes a width of 10 km on either side of the coast.

Figures 4.4 and 4.5 show the change of mean energy density at a height of 50 metres calculated for two different coastal zones. The change is given as a function of distance from the coast. A North Sea coast in the Netherlands and a Mediterranean coast in France were taken as examples. Generally, the shape of the curves depends on the geographical position and orientation of the coast as well as the roughness class of the coastal terrain. The conditions of a specific coast can be estimated by siting calculation procedures given in the next chapter.

In the first example from a North Sea coast in the Netherlands it is seen that the change to open-sea conditions takes place over $\sim$ 10 km whereas the change to land conditions occurs more abruptly, that is over $\sim$ 4 km. The second example shows the conditions at two French Mediterranean coastlines in a region strongly influenced by the Mistral. The two coastlines are perpendicular and parallel to the Mistral, respectively.

A common phenomenon in many coastal areas is the occurrence of a land/sea breeze. The *sea breeze* is a local wind blowing from sea to land, caused by the temperature difference when the sea is colder than the adjacent land. Therefore, it usually blows on relatively calm, sunny, summer days. The *land breeze* is the oppositely directed, usually weaker, night-time wind. Owing to the generally low wind speeds associated with the land/sea breeze it adds little to the wind energy potential of coastal areas.

Mountainous areas

The correspondence between the various levels of relative relief depicted in the resource maps and the five landscape types shown in Figs. 1.6-1.10 was explained in Chapter 2. It was further noted that the maps can be considered directly applicable to landscape types 1 and 2, applicable with some care to wide plains or wide valleys found in landscape types 3 and 4, but not applicable to landscape type 5. For this last type, it is necessary to look for a station in the station statistics which is in the region concerned and which can be considered typical of the investigated situation. It is also advisable to check relevant stations in the station statistics before using the map values given for landscape types 3 and 4.

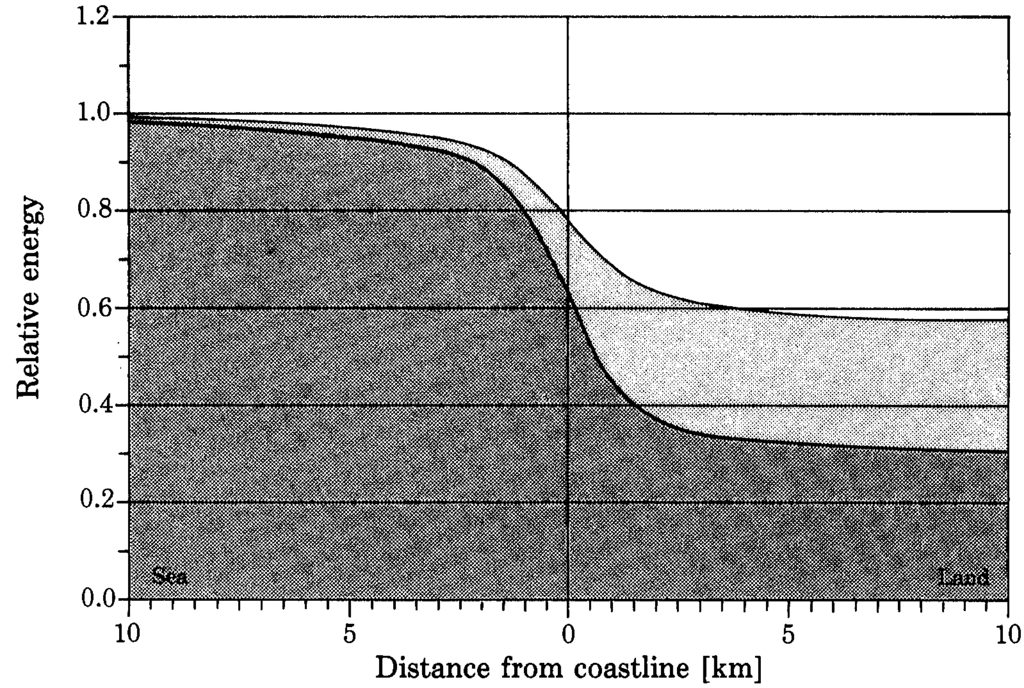


Figure 4.4: Mean energy density at a height of 50 m calculated as a function of the distance to the North Sea coast in the Netherlands for two different land roughnesses. The coast is oriented SW–NE and the terrain is of roughness class 1 (upper line) and roughness class 3 (lower line), respectively.

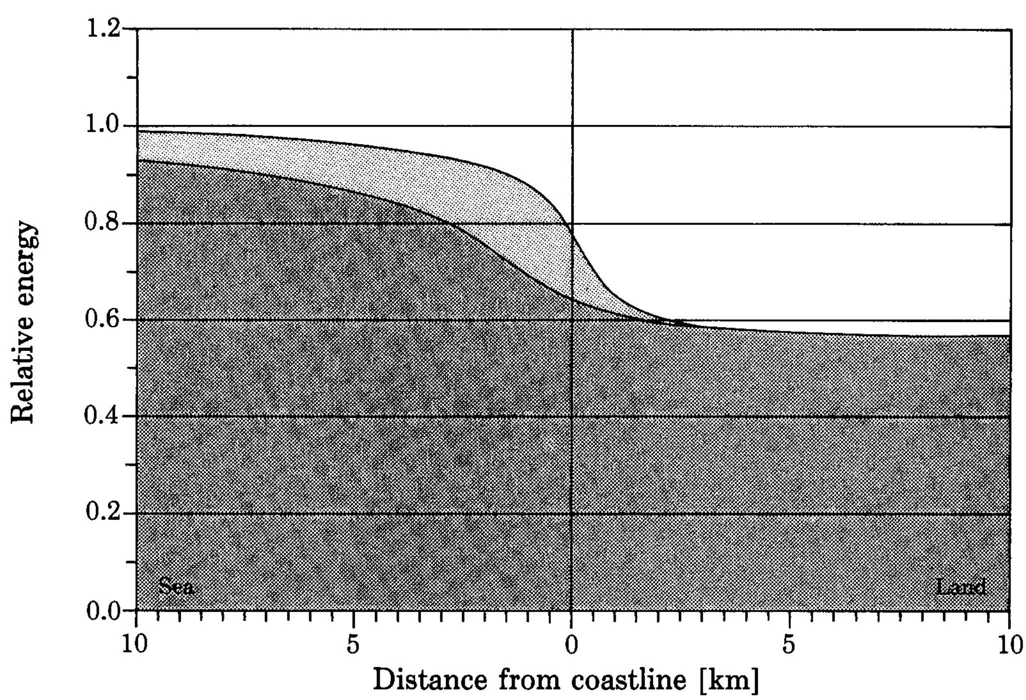


Figure 4.5: Mean energy density at a height of 50 m calculated for two coastlines as a function of the distances to the Mediterranean Sea in France. The two coastlines are situated in the region influenced by the Mistral; one is perpendicular (lower line) the other parallel (upper line) to the direction of the Mistral. The terrain is of roughness class 1.

As a general rule, wind resource estimation can be performed in hilly and mountainous terrain only by means of a numerical orographic model. Examples of resource calculations in hilly terrain are given in the next chapter in Section 5.4.

Figure 4.6 shows a perspective plot of the setting of the French station Mont Aigoual in the Massif Central. Statistics derived from this and similar stations are difficult to apply in connection with regional resource assessment except as indicators of the resources at sites with similar surroundings.

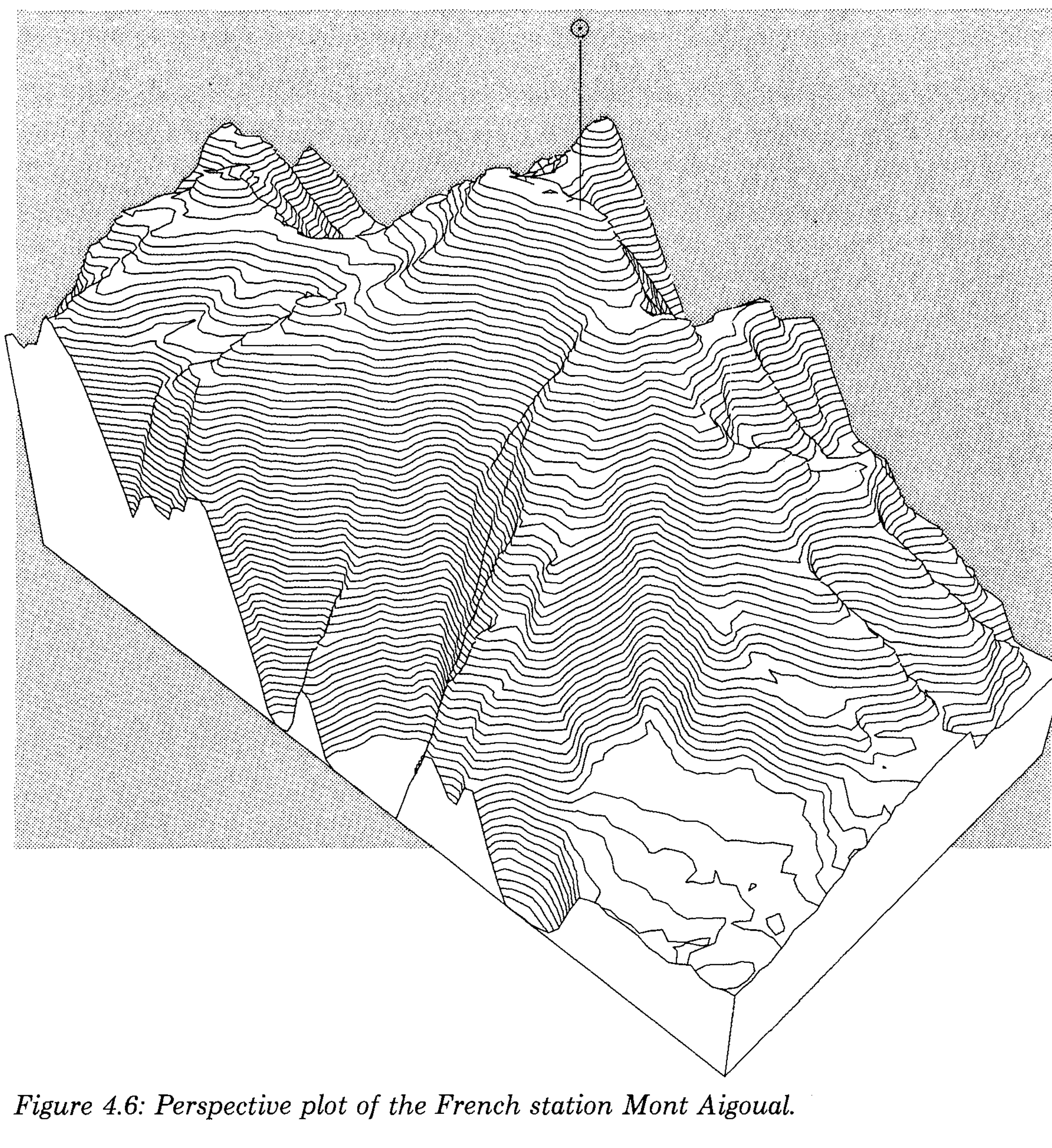


Figure 4.6: Perspective plot of the French station Mont Aigoual.

Orography gives rise to many local winds, such as föhns, mountain and valley winds, mountain-gap winds, and katabatic winds. Depending on their magnitude and frequency of occurrence they may give rise to sizeable wind energy potentials. However, before attempting to utilize such potentials, it is advisable to substantiate the expected resource by wind measurements, as local folklore might exaggerate the frequency of occurrence of high winds.

Chapter 5

Siting

For the purpose of this Atlas, siting is defined as *estimation of the mean power produced by a specific wind turbine at one or more specific locations.*

A full siting procedure includes considerations such as the availability of power lines and transformers, the present and future use of land, and so on; however, these aspects are not considered here.

A siting procedure includes some or all of the following steps:

- select the appropriate regional wind climatology
- determine the influence of the roughness of the surrounding terrain
- determine the influence of nearby sheltering obstacles
- determine the effect of local orography
- calculate the resulting Weibull distribution
- calculate the mean power by means of the Weibull distribution and the power curve of the wind turbine.

5.1 Selection of wind climatology for a site

The selection of an appropriate regional wind climatology for a site is a matter of selecting the statistics from one of the analysed stations.

It is preferable to select a station situated in a topographical setting similar to that of the site. This consideration is particularly important in mountainous and coastal areas. The selected station should preferably be no more than 100 km from the site.

Power predictions for sites in terrain type 5 are likely to be very uncertain, and it is recommended that the site and the selected station should be situated in terrains which resemble each other closely. As noted previously, however, siting in hilly and mountainous terrain can generally be performed on a computer only by means of a numerical orographic model.

The quality of the statistics from a station can be judged from the information given in the station statistics:

- the description of local conditions given for each station
- the raw data statistics
- the wind climatological fingerprint.

The descriptions might indicate problems with the data quality, e.g. that the measurements were taken at the top of a building or with significant sheltering obstacles close by.

The raw data statistics can disclose some data anomalies such as channelling of the flow which gives very high frequencies of occurrence in certain wind direction sectors and often in two diametrically opposed sectors. An example is the UK station, Fort Augustus, at which the statistics clearly show the effect of Great Glen Valley on the flow. Further, high sheltering conditions leading to high frequencies of wind speed below 1 $m\,s^{-1}$ may be revealed by these statistics.

The wind climatological fingerprints can be used to judge whether certain characteristics - such as the yearly and daily variation - are in accordance with general experience. The figure for the monthly means over the period of measurements may hint at a possible trend in the data series.

If possible, the use of highly sheltered stations should be avoided in siting. For sites where a strong orographic-induced channelling of the flow is obvious, a possibility may be to use a nearby radiosonde station. An example is given in Chapter 9 (Table 9.1) where the statistics from Stornoway radiosonde station are used to predict the wind climate at Fort Augustus.

Stations which are considered to be representative of the same wind climate are compared in Chapter 9. The results can be used to judge the applicability of a station for siting in a certain region.

5.2 Roughness classification and calculation of statistics for a site

The roughness classification of the terrain at a given site is a matter of assigning the correct roughness lengths or roughness classes to the various types of surface around the site. The horizon is first divided into twelve 30-degree sectors, and the classification is then done sector by sector. If the classification is done in terms of roughness classes the corresponding Weibull distributions are found in the selected regional statistics. If the terrain is of the same roughness class for all sectors, the statistics are obtained directly from the *Total* columns. Most often the terrain roughness is not the same in all directions, and the statistics have to be found for each sector with the appropriate roughness class. Thereafter, the sector statistics have to be combined into one total statistic, i.e. one Weibull distribution function, for the site. Methods are given in the next section for determining both the effect of changes of roughness class from one sector to another and within one or more sectors.

If a roughness length has been selected and this does not correspond to a roughness class (class 1: z_0 = 0.03 m, class 2: z_0 = 0.10 m, class 3: z_0 = 0.40 m) then the Weibull parameters are obtained by interpolation or extrapolation of the table values. This applies to roughness assignment over *land*. Roughness class 0 (z_0 = 0.0002 m) refers to conditions over *water sufaces:* if a land surface is assigned a roughness length smaller than the class 1 value of 0.03 m, the corresponding Weibull parameters are found by extrapolation using the values for roughness class 1 and 2. For roughnesses larger than 0.4 m the Weibull parameters are found by extrapolation using the values for classes 2 and 3. For the selected roughness length z_0' a weighting factor W is calculated:

$$W = \frac{\ln(z_{0b}/z_0')}{\ln(z_{0b}/z_{0a})} \tag{5.1}$$

where z_{0a} = 0.03 m and z_{0b} = 0.10 m if $z_0' < 0.10$ m, and z_{0a} = 0.10 m and z_{0b} = 0.40 m if $z_0' > 0.10$ m. The Weibull parameters are then:

$$\begin{aligned} A' &= W A_a + (1 - W)A_b \\ k' &= W k_a + (1 - W)k_b \\ f' &= W f_a + (1 - W)f_b \end{aligned} \tag{5.2}$$

where subscripts a and b refer to the table values for the two roughnesses z_{0a} and z_{0b}, respectively.

Similarly, interpolation or extrapolation to a height other than a table entry can be done by using Eq. 5.2 with $W = \ln(z_b/z)/\ln(z_b/z_a)$, where subscripts a and b refer to table heights z_a and z_b, z_b being the larger of the two.

Calculation of mean power density

The mean power in the wind over areas of a specified roughness class is given directly by the wind resource maps in Chapter 2. It was shown in Chapter 4 how the maps could be used for regional resource assessments. However, for local assessments, as for example comparisons between different possible sites in a region, it is most often necessary to perform the calculations using the appropriate station statistics.

The mean power density E in the wind, which is equal to the average kinetic energy flux per unit area perpendicular to the flow, is given by (see Chapter 8):

$$E = \frac{1}{2} \rho u^3 \tag{5.3}$$

where ρ is the mean density of the air†, and u^3 is the mean value of the third power of the wind speed. In terms of the Weibull parameters A and k, the mean power can be expressed as:

$$E = A^3 F_E(k) \tag{5.4}$$

The function $F_E(k)$ is tabulated in Appendix B, Table B.2, thus E can be calculated for each direction sector. The total mean power is then given by the weighted sum:

$$E = f_1 E_1 + f_2 E_2 + \cdots + f_{12} E_{12} \tag{5.5}$$

in which $f_1, f_2, \ldots, f_{12}$ are the frequencies of occurrence for the individual sectors, and $E_1, E_2, \ldots, E_{12}$ are the mean powers in the twelve sectors calculated from Eq. 5.4.

In situations where the roughness class is not the same in all sectors, the sum of the frequencies as read from the station statistics is not exactly 100%. This is because the angle between the geostrophic wind and the surface wind depends upon the surface roughness, as described in Chapter 8. The deviation is quite small and can often be neglected. In the following examples it is taken into account by normalizing:

$$E = \frac{\sum f_i E_i}{\sum f_i} \tag{5.6}$$

Example 5.1 Calculate the mean power density at a height of 50 metres at a site on the shore line in the northwestern part of the Netherlands. The required information is extracted from the *Eelde* station statistics and is summarized in Table 5.1.

In Example 5.2 in the next section this estimate is compared with the corresponding estimates obtained from four nearby Dutch stations.

†More correctly, ρ should be assigned the value $\overline{\rho u^3}/\overline{u^3}$, where overbar designates averaging over time. Values of ρ for a range of temperatures and altitudes are given in Appendix B, Table B.1. See also Section 6.1.

Table 5.1: Scheme for calculating the mean power density.

Sector	R.cl.	A	k	f	E
1	0	8.7	2.58	5.6	436
2	0	8.0	2.47	6.5	348
3	0	9.3	2.25	7.7	587
4	1	7.3	2.40	9.0	270
5	1	6.6	2.38	6.8	201
6	1	6.7	2.22	5.6	222
7	1	8.1	2.14	8.7	405
8	1	8.9	2.27	12.3	511
9	1	8.7	2.31	14.4	470
10	0	10.4	2.22	11.2	830
11	0	9.6	2.14	7.7	674
12	0	9.5	2.49	6.1	580

$$E = \frac{\sum f_i E_i}{\sum f_i} = \frac{489}{1.02} = 479 \text{ Wm}^{-2}$$

Calculation of Weibull parameters

The Weibull parameters corresponding to a situation in which the roughness is not the same in all sectors can be calculated to a good approximation by use of the mean and mean square values:

$$\begin{aligned} M &= A \cdot \Gamma\left(1 + \frac{1}{k}\right) \\ u^2 &= A^2 \cdot \Gamma\left(1 + \frac{2}{k}\right) \end{aligned} \tag{5.7}$$

where M is the mean value, u^2 the mean square value in a Weibull distribution with parameters A and k, and Γ is the gamma function, see Section 8.6 for definitions. Using these equations, M and u^2 can be determined for each direction sector. The values for the total distribution are then given by the weighted sums:

$$\begin{aligned} M &= f_1 M_1 + f_2 M_2 + \cdots + f_{12} M_{12} \\ u^2 &= f_1 u_1^2 + f_2 u_2^2 + \cdots + f_{12} u_{12}^2 \end{aligned} \tag{5.8}$$

The Weibull parameters corresponding to the total distribution can then be estimated by using the expressions:

$$\frac{M^2}{u^2} = \frac{\Gamma^2(1+\frac{1}{k})}{\Gamma(1+\frac{2}{k})} \quad \text{and} \quad M = A \cdot \Gamma\left(1+\frac{1}{k}\right) \tag{5.9}$$

where A and k now represent the parameters in the total distribution. To assist in practical applications, the solutions to these equations are tabulated in Appendix B, Tables B.5 and B.6. Likewise the gamma function is tabulated in Tables B.3 and B.4 for the relevant range of values.

The procedure for determining the Weibull parameters for the total distribution can be summarized in the following steps:

- Determine A and k together with f for each sector.
- Determine $F_M(k)$ by using Table B.3 for each sector; then multiply by A for the sector to obtain $M_1, M_2, \ldots, M_{12}$.
- Determine u^2 for each sector (i.e. u_1^2, u_2^2, ..., u_{12}^2) by means of $F_u(k)$ from Table B.4 and $u^2 = A^2 \cdot F_u(k)$.
- Compute the weighted sum of the mean values and the mean squares to obtain the mean value M and mean square value u^2 for the total distribution.
- Calculate M^2/u^2 and use the value in Table B.5 to obtain k for the total distribution.
- Use k from step 5 in Table B.6 to obtain $F_A(k)$ and use $A = M/F_A(k)$ with M obtained in step 4 to find A for the total distribution.

These calculations are easily carried out, as illustrated in the following examples.

Example 5.2 Consider the situation in the previous example and calculate the Weibull parameters for the wind speed distribution.

The information obtained from the *Eelde* station statistics is given in Table 5.2 and the procedure outlined above is summarized below the table.

Table 5.2 Scheme for calculating the Weibull parameters of the total distribution.

Sector	R.cl.	A	k	f	M	u^2
1	0	8.7	2.58	5.6	7.7	70.0
2	0	8.0	2.47	6.5	7.1	59.8
3	0	9.3	2.25	7.7	8.2	82.9
4	1	7.3	2.40	9.0	6.5	50.1
5	1	6.6	2.38	6.8	5.9	41.1
6	1	6.7	2.22	5.6	5.9	43.2
7	1	8.1	2.14	8.7	7.2	63.9
8	1	8.9	2.27	12.3	7.9	75.7
9	1	8.7	2.31	14.4	7.7	71.9
10	0	10.4	2.22	11.2	9.2	104.1
11	0	9.6	2.14	7.7	8.5	89.8
12	0	9.5	2.49	6.1	8.4	84.1

$$M = \frac{\sum M_i f_i}{\sum f_i} = \frac{7.74}{1.02} = 7.6$$

$$u^2 = \frac{\sum u_i^2 f_i}{\sum f_i} = \frac{72.8}{1.02} = 71.4$$

$$\frac{M^2}{u^2} = 0.809$$

$$k = F_k(0.809) = 2.17 \qquad \text{(Table B.5)}$$

$$A = M \cdot F_A(2.17) = 8.6 \qquad \text{(Table B.6)}$$

Table B.2 can now be used to estimate the total available power density:

$$E = A^3 F_E(k) = 8.6^3\ F_E(2.17) = 4195\ \text{kWh m}^{-2}\text{y}^{-1} = 479\ \text{Wm}^{-2}$$

As expected, the result is the same as that obtained in Example 5.1.

A recalculation of the example using the statistics from the nearby stations Schiphol, Leeuwarden and Texel gives the results shown in Table 5.3. The table shows that the estimates compare very well.

It should be noted that the procedure described in this section assumes that the total distribution is a Weibull distribution; therefore, the weaker the resemblance, the less reliable are the calculations.

Table 5.3: Estimates of mean wind speed, mean power density and Weibull parameters at 50 metres height at a site at the North Sea coast in the Netherlands. Calculated by means of the statistics from four Dutch stations.

Station	M $\mathrm{ms^{-1}}$	A $\mathrm{ms^{-1}}$	k	E $\mathrm{Wm^{-2}}$
Eelde	7.6	8.6	2.17	479
Schiphol	7.6	8.6	2.17	480
Leeuwarden	7.8	8.8	2.16	516
Texel	7.6	8.6	1.97	524

This section has shown how the Weibull parameters can be estimated in the case where the roughness class is not the same for all direction sectors. It is not uncommon, however, to encounter situations where the terrain in one or more sectors cannot be thought of as homogeneous because of marked roughness changes, which occur at some distance from the point of interest. To estimate the Weibull parameters in such cases, a simple method can be used which builds on the experimental evidence that an internal boundary layer develops downstream from a change in terrain roughness. The height of this boundary layer increases with downstream distance. Outside this layer the roughness change is not felt, and the wind speed is determined by the upstream terrain roughness. Within the layer the wind speed depends on downstream as well as upstream roughnesses.

The situation with a roughness change, shown in Fig. 5.1, is then as follows: the air passes over an area with surface roughness z_{01} onto an area with surface roughness z_{02}. Upstream from the roughness change and above the developing internal boundary layer the wind speed is determined by the upstream roughness z_{01}. Below the height h downstream from the roughness change, the wind speed is the upstream value modified by a factor which depends on the height above ground, the two roughnesses, and the height h. The height h can be read from Fig. 5.2; h should be taken from the curve corresponding to the largest of the two roughness classes. Alternatively, h can be determined from the expression:

$$\begin{aligned} \frac{h}{z_0'}\left(\ln\frac{h}{z_0'} - 1\right) &= 0.9 \cdot \frac{x}{z_0'} \\ z_0' &= \max(z_{01}, z_{02}) \end{aligned} \tag{5.10}$$

If the hub height is greater than h the terrain can be considered homogeneous as seen from the wind turbine, and it is not necessary to take the change of roughness into consideration. On the other hand, if the hub height is less than h, the Weibull parameters must be modified to account for the effect of roughness change on the wind speed distribution. The recommended procedure for correcting the Weibull parameter is as follows:

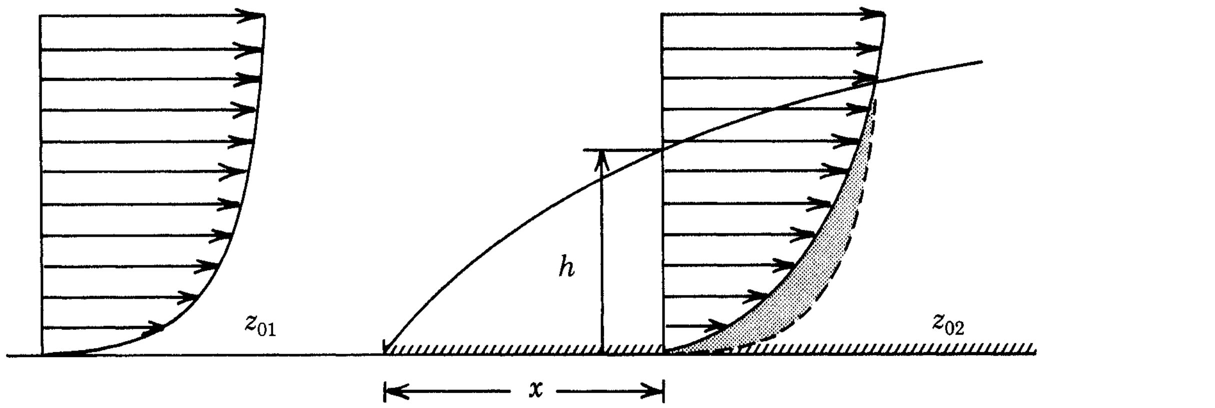


Figure 5.1: Idealized situation of flow with a marked change of roughness class. The figure shows the wind profile and roughness z_{01} before the roughness change together with the modified profile at a distance x downwind from the change. The roughness after the change is z_{02}. The height of the internal boundary layer h is a function of x.

- determine the A and k parameters for the upwind conditions, z_{01}, as described in this chapter.
- determine the height h of the internal boundary layer from Eq. 5.10 or Fig. 5.2.
- if the hub height is greater than h then no correction should be applied.
- if the hub height is less than h then the Weibull parameter A determined for the upwind conditions is corrected to the site condition:

$$\begin{aligned} A_{site(z_{02})} &= A_{upwind(z_{01})} \cdot \mathrm{Cor} \\ \mathrm{Cor} &= \frac{\ln(z/z_{02})\ \ln(h/z_{01})}{\ln(z/z_{01})\ \ln(h/z_{02})} \end{aligned} \tag{5.11}$$

In cases where the terrain before the roughness change is quite homogeneous, but the terrain after the roughness change consists of areas of different roughnesses, a resulting roughness z_0^R can be estimated by means of Table 5.4.

The procedure is to divide the segment into quarters of approximately equal roughness, and Table 5.4 gives the overall roughness length of the segment as a function of the number of quarters of each roughness class in the segment.

When the sector segment is divided, it should be borne in mind that areas close to the site will exert the strongest influence on the wind speed at the site. Using the principle shown in Fig. 5.3, high weights are assigned to nearby areas when each of the areas I, II, III and IV are given the same weight. Hence, if areas I, II, III and VI are of class 0, 1, 2 and 3, respectively, the resulting roughness derived from Table 5.4 is $\approx$ 0.04 m.

Table 5.4: Area-weighted roughness lengths, z_0^R. The area is divided into quarters and each quarter is classified according to the Wind Atlas roughness classification. z_0^R is given as a function of the number of quarters of each roughness class in the area.

Class:	0	1	2	3	z_0^R
z_0 [m]:	0.0002	0.03	0.10	0.40	[m]
	3	1			0.001
	3		1		0.002
	3			1	0.003
	2	2			0.004
	2	1	1		0.006
	2	1		1	0.010
	2		2		0.009
	2		1	1	0.015
	2			2	0.025
	1	3			0.011
	1	2	1		0.017
	1	2		1	0.027
	1	1	2		0.024
	1	1	1	1	0.038
	1	1		2	0.059
	1		3		0.033
	1		2	1	0.052
	1		1	2	0.079
	1			3	0.117
		3	1		0.042
		3		1	0.064
		2	2		0.056
		2	1	1	0.086
		2		2	0.127
		1	3		0.077
		1	2	1	0.113
		1	1	2	0.163
		1		3	0.232
			3	1	0.146
			2	2	0.209
			1	3	0.292

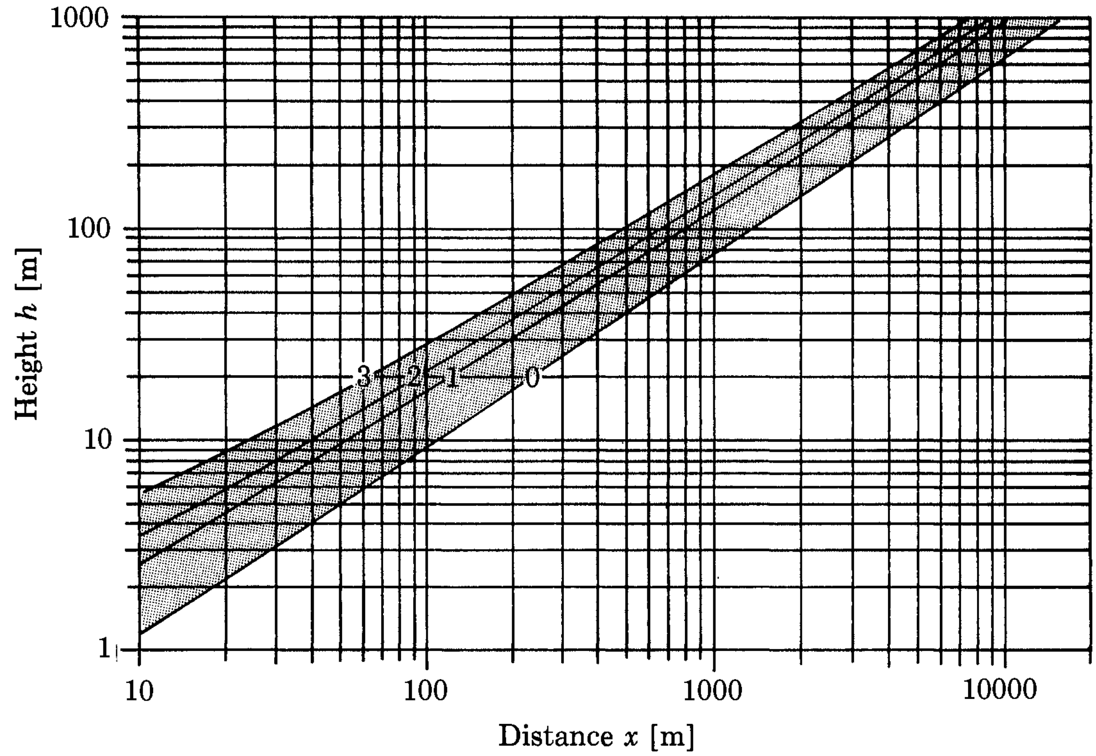


Figure 5.2: Height of the internal boundary layer h as a function of distance x downstream from a roughness change, for the four roughness classes (0 to 3).

Example 5.3 Figure 5.4 shows a 30 m high wind turbine situated 2 km from the coast in flat, open farmland. The roughness change occurs clearly at the coast hence the upwind roughness length is 0.0002 m. It is then necessary to determine the roughness of the segment from the coast to the minimum distance L from the turbine where the roughness of the terrain can be felt at hub height. The length L can be read from Fig. 5.2; for a hub height of 30 m in class 1 terrain, L becomes 200 m. For the segment, Table 5.4 gives an overall roughness length of $\simeq$ 0.16 m. The height h is estimated from Fig. 5.2 or Eq. 5.10 to $h \simeq 280$ m, and the correction factor becomes:

$$\mathrm{Cor} = \frac{\ln(30/0.16)\ \ln(280/0.0002)}{\ln(30/0.0002)\ \ln(280/0.16)}$$

$$\mathrm{Cor} \simeq 0.83$$

Hence, if the upstream A-parameter - over water at 30 metres height - is determined from the station statistics to be, say 7 m s^{-1}, then the A-parameter at hub height in the sector segment considered is $7 \cdot 0.83 = 5.8$ m s^{-1}. The k-parameter is not corrected.

For situations where significant and complicated changes of roughness occur in the terrain, it is necessary to use a more elaborate theory as described in Chapter 8.

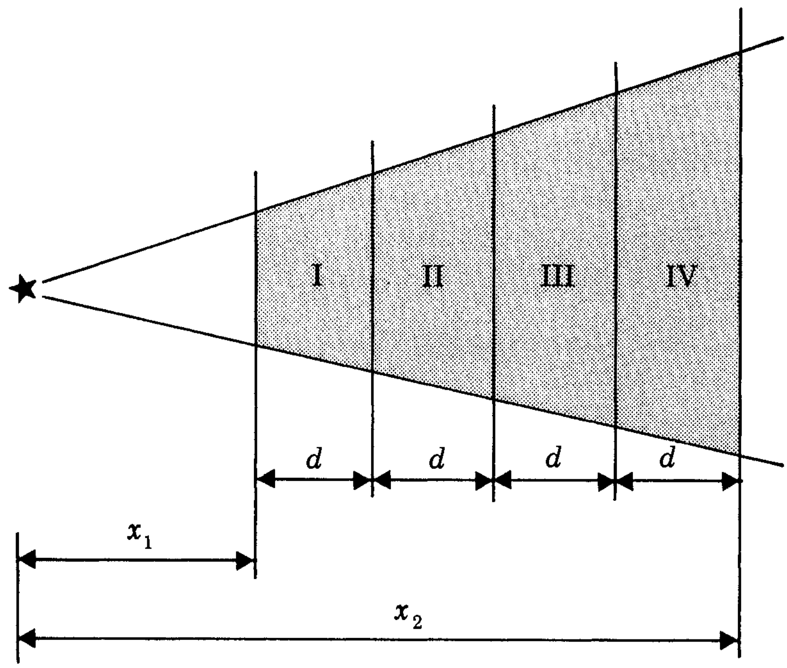


Figure 5.3: Principle of weighting areas in roughness calculations.

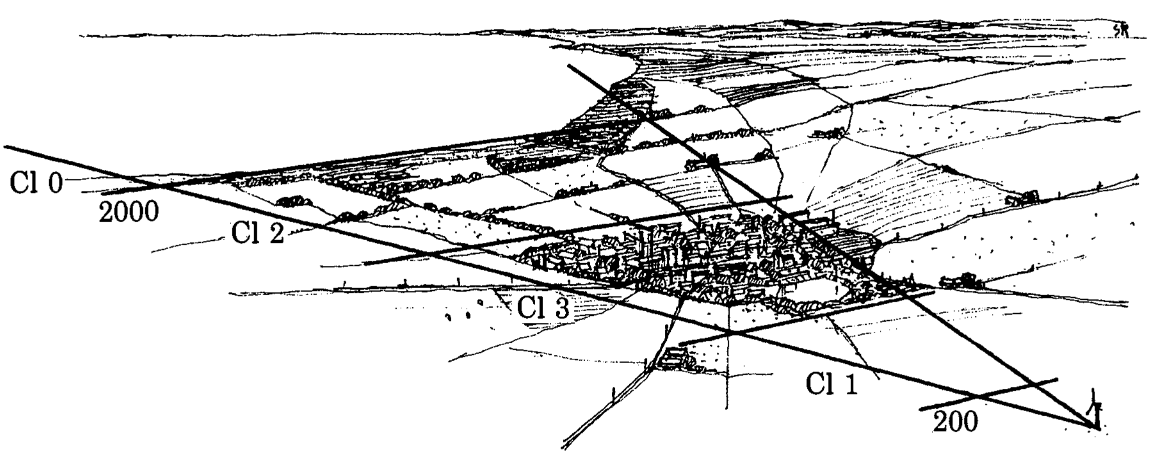


Figure 5.4: An example of roughness classification (Example 5.3).

5.3 Calculation of shelter

The location of wind turbines close to buildings should be avoided, because the lifetime of the turbine might be shortened owing to the disturbed flow around buildings and the power production reduced. The loss of production can be estimated by means of the principles given in Section 3.2.

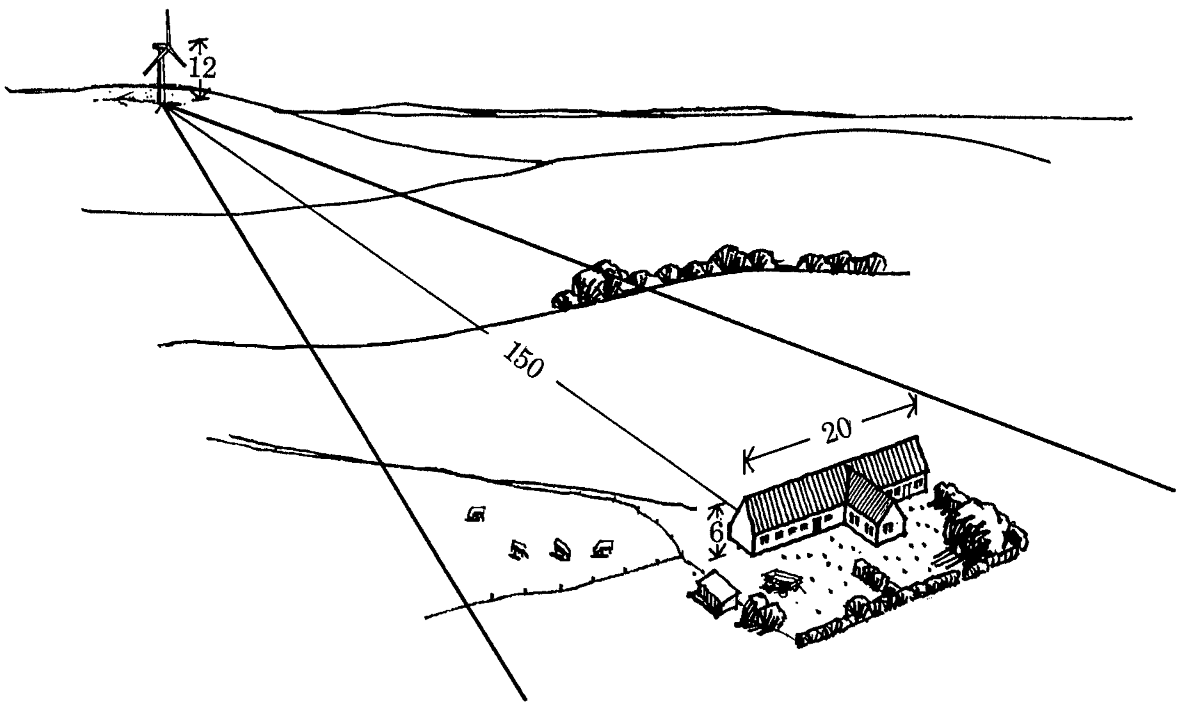


Figure 5.5: An example of shelter behind a building (Example 5.4).

Example 5.4 Figure 5.5 illustrates a common situation with a farm house present in one of the direction sectors. The A-parameter is reduced in this sector by the following calculations:

distance from turbine to house	x	=	150 m
height of building	h	=	6 m
hub height	H	=	12 m

then $x/h = 25$ and $H/h = 2$, which, when used as entries in Fig. 3.2, gives $R_1 \simeq 16\%$. This reduction applies to an infinitely long house; Eq. 3.4 gives the reduction due to the limited length of the house (20 metres):

$$R_2 = 2\,\frac{L}{x} = 2\,\frac{20}{150} = 0.27$$

Finally, Eq. 3.5 gives the corrected A-parameter in the sector considered:

$$\begin{aligned} A_{cor} &= A(1 - 0.16 \cdot 0.27) \\ A_{cor} &= 0.96\,A \end{aligned}$$

The k-parameter is not corrected.

For more complicated situations with several obstacles occurring in the same sector, it is necessary to use a more complicated calculation procedure as described in Chapter 8.

5.4 Orography

It is well known that at the crest of a hill the wind will often be stronger than over the surrounding terrain. Therefore it might be advantageous to place turbines on top of a hill.

For the simple case of a long ridge perpendicular to the wind, the speed-up ΔS and the height of maximum speed-up l can be calculated from Eqs. 3.7 and 3.8.

If the hub height H is not equal to the height l, the speed-up ΔS is found for the height H as follows:

$$\Delta S_H = \begin{cases} \Delta S_l & \text{for } H \leq l \\ \Delta S_l \cdot \dfrac{\ln(H/2L)}{\ln(l/2L)} & \text{for } l < H \leq 2L \\ 0 & \text{for } 2L < H \end{cases} \tag{5.12}$$

where L is half the width of the hill as shown in Fig. 3.6. The effect of placing a wind turbine at the top of a hill is then taken into account in the determination of the Weibull parameters by increasing the A-parameter for the sectors where the wind is accelerated by the hill:

$$A_{cor} = A(1 + \Delta S) \tag{5.13}$$

The Weibull parameter k is not corrected.

It must be stressed that the procedure applies only to sites on the summit of an isolated ridge and that the slopes must not exceed ~ 0.3.

Example 5.5 As an example of the calculation of speed-up effects on a smooth single hill, Figs. 5.6-5.10 show the results obtained by applying the orographic model (Chapter 8) to the Blasheval hill in Scotland. The flow perturbations induced by this hill were the subject of a study described in Mason and King (1985). A contour plot of the hill is shown in Fig. 5.6 and a perspective plot of the hill is shown in Fig. 5.7. In Fig. 5.8 the relative speed at 8 m above ground for winds from the direction 210° is shown for positions along a line crossing the summit; the line is indicated in Fig. 5.7. The overspeeding predicted at the summit is close to 70% which is also the observed value. Similarly, it is possible to estimate the speed-up by using Eq. 5.10: the surface roughness is 0.01 m and from Eq. 3.8 one can estimate the height l, where the speed-up is maximum, to be 2.5 m. Here the value of L is taken as 230 m, estimated from Fig. 5.6 or Fig. 5.8. When these values are inserted, Eq. 5.10 predicts a speed-up of 68%. However, the simple formula (Eq. 5.10) can only be applied to the case of a clearly defined single hill, and only for the estimation of speed-up at the summit.

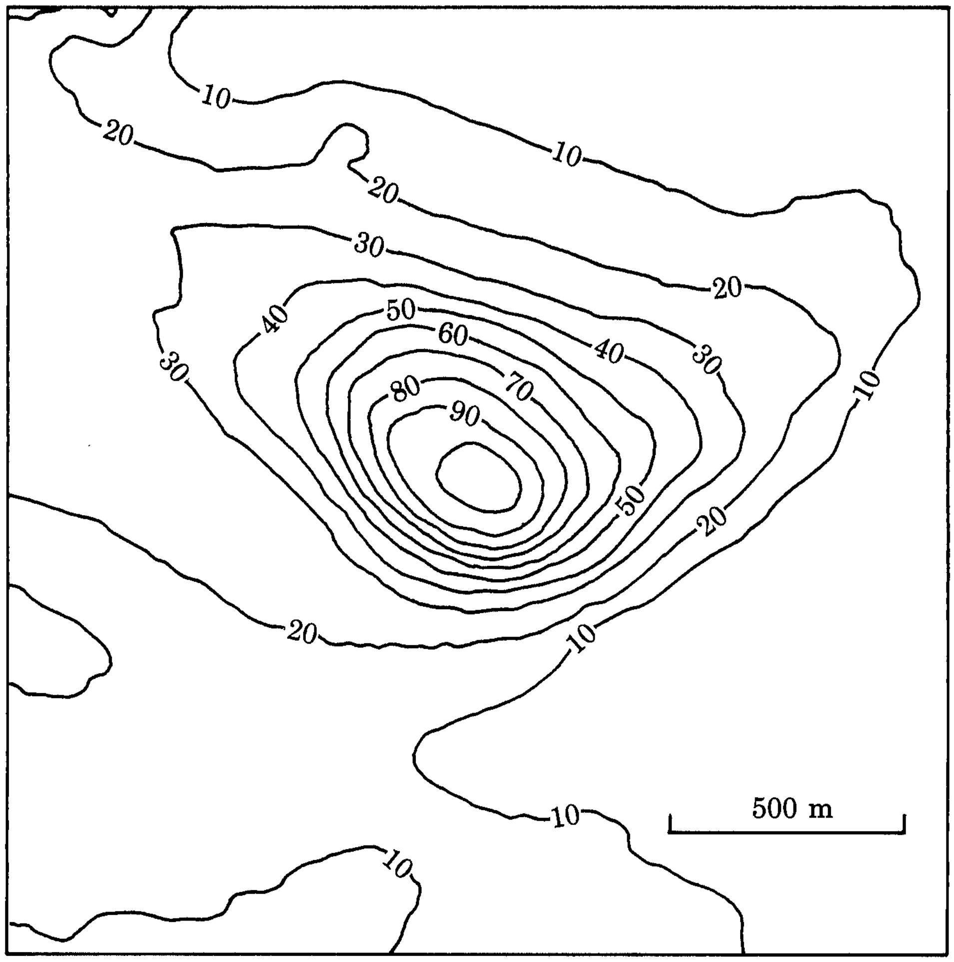


Figure 5.6: Contour map of Blasheval hill. Heights above sea level are shown for every 10 metres.

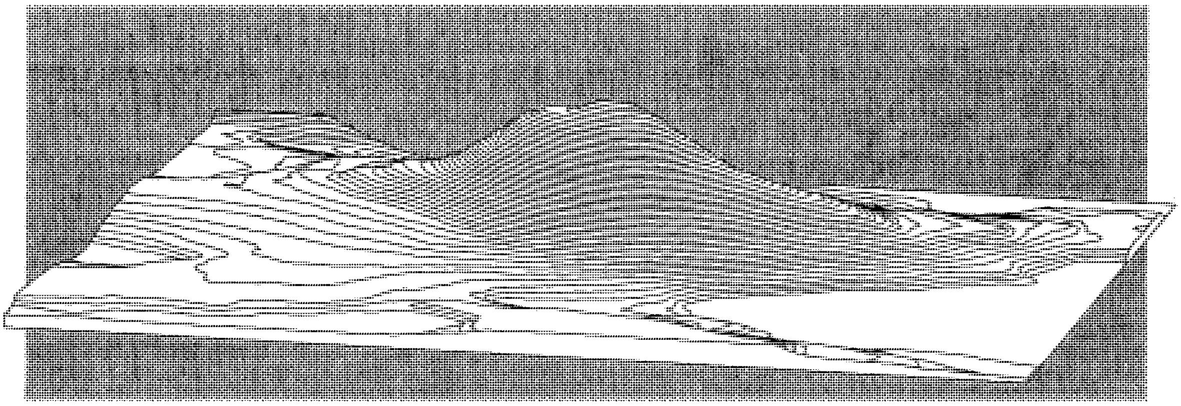


Figure 5.7: Perspective plot of Blasheval hill. The hill is seen from the south. The vertical scale is exaggerated by a factor of 5.

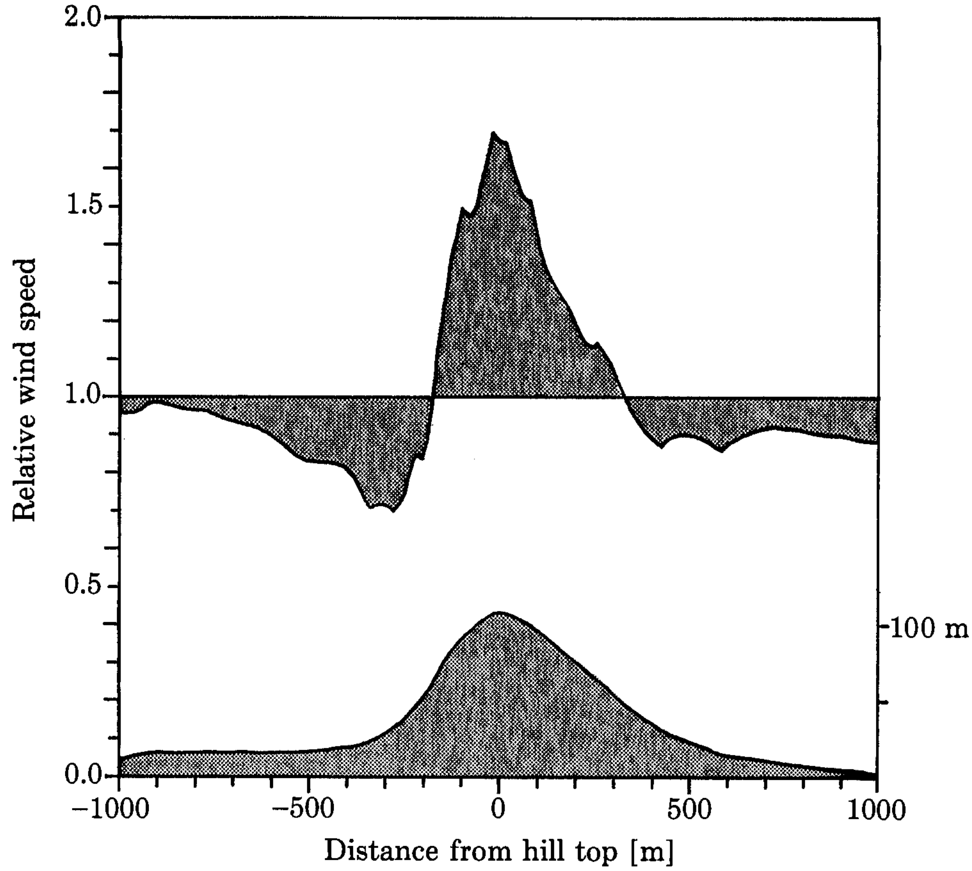


Figure 5.8: Modification of wind speed along a horizontal line across the summit of Blasheval Hill. The line is indicated in Fig. 5.6. The horizontal axis gives distance in metres from the summit. The vertical axis gives the calculated relative speed-up factor at 8 m above ground level. The lower shaded graph shows the height cross-section of the hill.

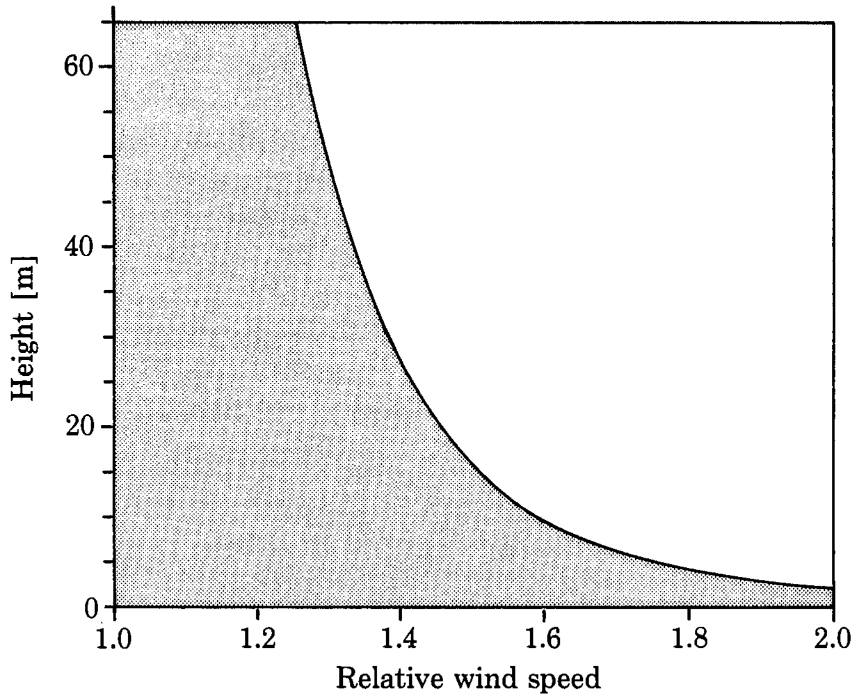


Figure 5.9: Modification of wind speed in a vertical profile above the summit of Blasheval hill. The horizontal axis gives the speed-up factor of the wind speed. The vertical axis gives the height above ground level.

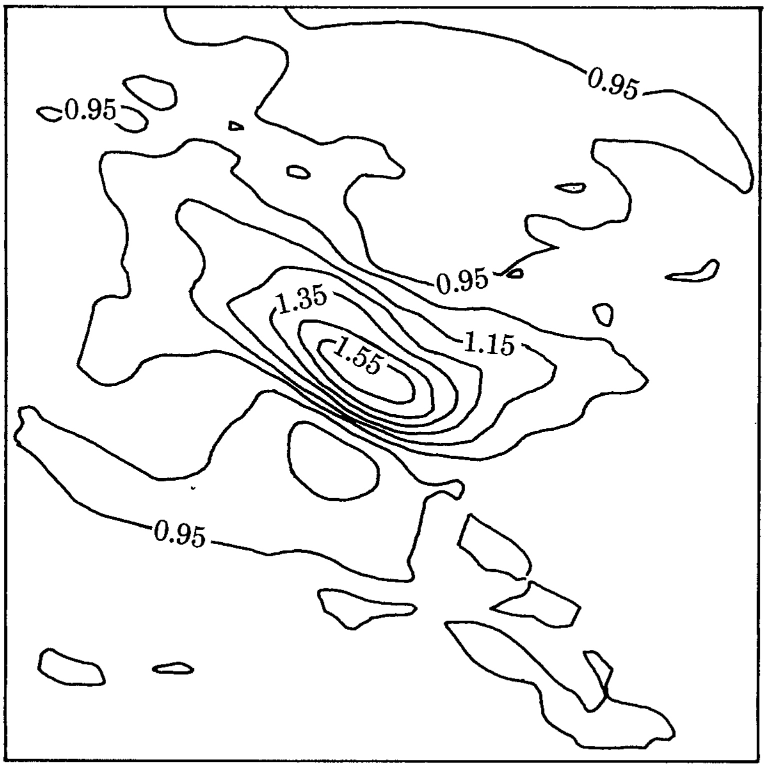


Figure 5.10: Modification of wind speed in an area around Blasheval hill. The relative increase of wind speed at 8 m above ground level is shown by contours of equal speed increase/decrease. The figure was drawn from results obtained by applying the orographic model in each gridpoint of a 51 × 51 grid.

An example of a more complicated topography is given in Figs. 5.11-5.13. A contour plot of the surroundings of the meteorological station of Burrington, UK, is shown in Fig. 5.11, and a perspective plot is shown in Fig. 5.12. In both of these figures a line is indicated (the horizontal line in Fig. 5.11, the meteorological station is located at the intersection of the two lines) along which the speed-up at 10 m above ground for winds from 270° was calculated using the orographic model. The results together with the terrain height along this line are shown in Fig. 5.13. The terrain is undulating with hills and valleys and the slopes are moderate. This induces speed-up effects of the order of $\simeq$ 10%. The figures illustrate the importance of careful siting even in cases of relatively uncomplicated terrain of landscape type 2.

Most real landscapes contain a mixture of topographic features which influence the winds. The modifications of wind speed near the ground for small or moderate hills and typical changes of vegetation and density of obstacles are of similar magnitude. Figure 5.14 shows a (somewhat exaggerated) variation of the wind speed at 10 m above ground, as one moves inland from the sea coast in Denmark. A proper siting procedure consists of taking all the effects indicated in the figure into account.

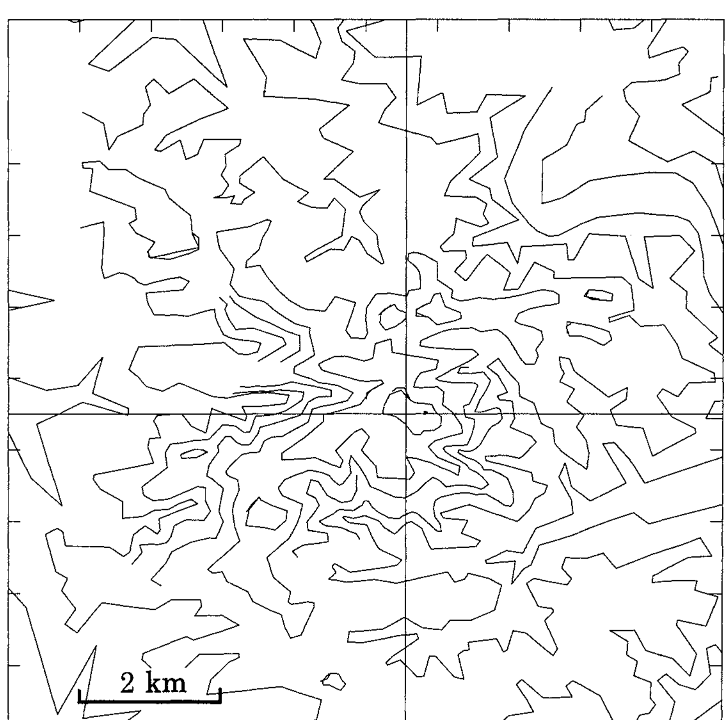


Figure 5.11: Plot of the digitized terrain around Burrington, UK, used as input to the orographic model. The meteorological station is situated at the intersection of the two straight lines. The calculated speed-up factors along the horizontal line are shown in Fig. 5.13.

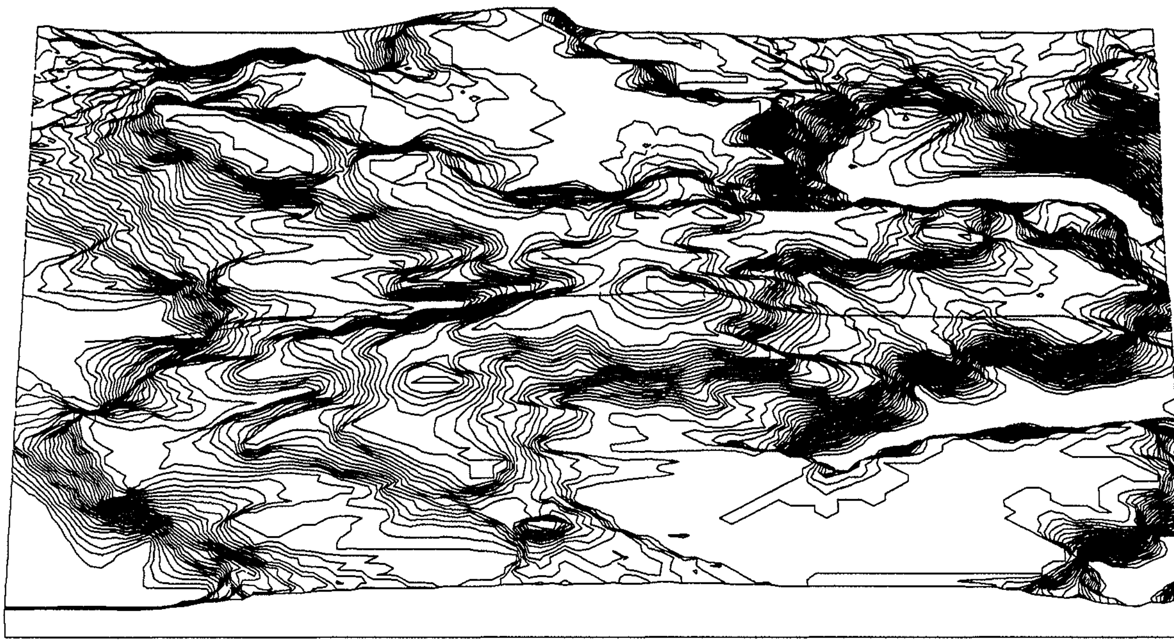


Figure 5.12: Perspective plot of the surroundings of the station at Burrington, UK. The vertical scale is exaggerated by a factor of 5. The line indicated in the terrain corresponds to the horizontal line in Fig. 5.11.

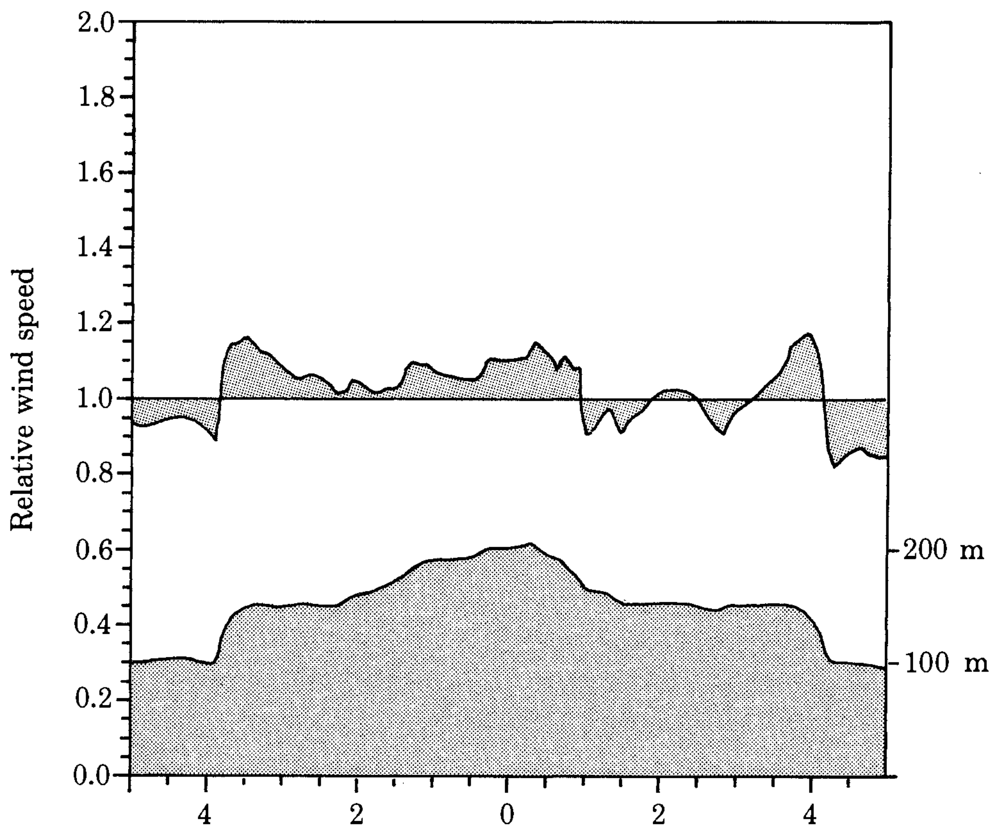


Figure 5.13: Modification of wind speed along the horizontal line shown in Fig. 5.11. The horizontal axis gives distance in kilometres from the meteorological station. The vertical axis gives the calculated relative speed-up factor 10 m above ground level. The lower shaded graph shows the height cross-section along the same line.

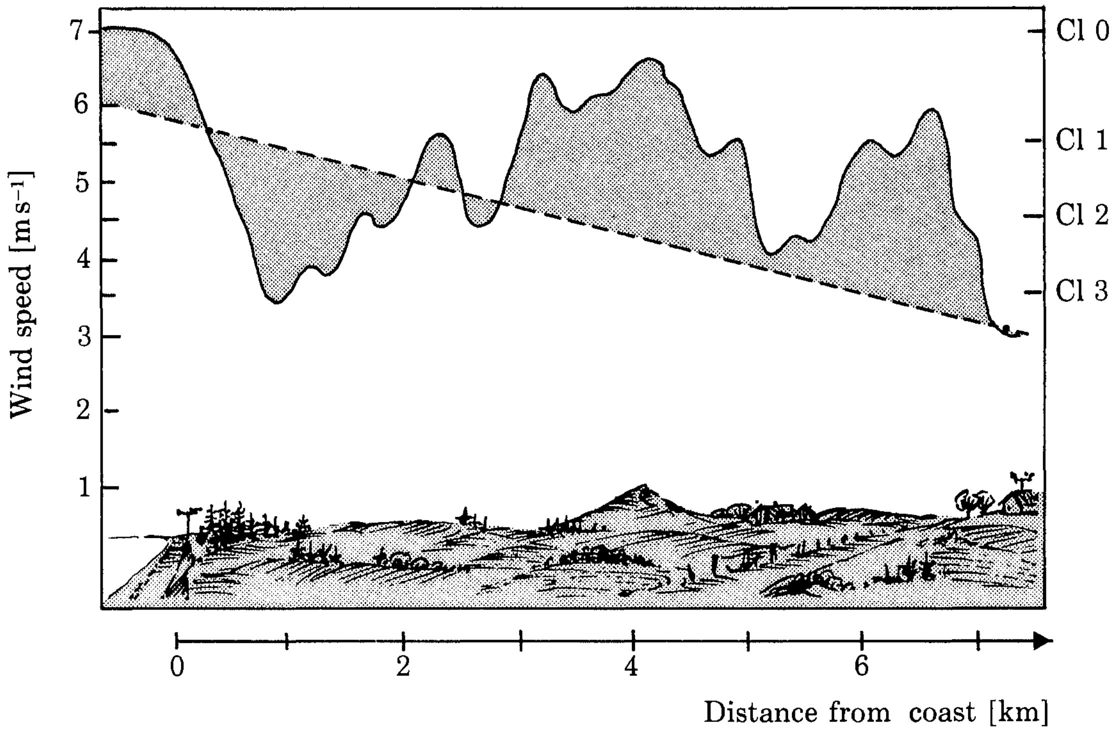


Figure 5.14: The variation of the mean wind speed 10 metres above ground due to the effects of topography (full line). The variation is slightly exaggerated, but the range is typical of conditions in Denmark. The dashed line indicates the mean wind speed obtained by interpolation between two stations only a few kilometres apart. The difference between the two curves illustrates the typical errors incurred through negligence of small-scale topographical effects.

Chapter 6

Power production

The power production by a wind turbine varies with the wind that strikes the rotor. It is common practice to use the wind speed at hub height as a reference for the power response of the wind turbine. The power produced as function of the wind speed at hub height is conventionally called the *power curve*. Figure 6.1 shows a sample power curve: when the wind speed is less than the *cut-in* wind speed, the turbine will not be able to produce power. When the wind speed exceeds the cut-in speed, the power output increases with increasing wind speed to a maximum value, the *rated power*; thereafter the output is almost constant. At wind speeds higher than the *cut-out* speed the wind turbine is stopped to prevent structural failures.

6.1 Determination of mean power production

Once the power curve $P(u)$ is measured for a wind turbine, the mean power production can be estimated provided the probability density function of the wind speed at hub height is determined either by measurements or a siting procedure as described in Chapter 5:

$$P = \int_0^\infty Pr(u)P(u)\,du \tag{6.1}$$

If the probability density function $Pr(u)$ has been determined through the siting procedure, it is given as a Weibull function in which case the expression of the mean power production becomes:

$$P = \int_0^\infty \left(\frac{k}{A}\right) \left(\frac{u}{A}\right)^{k-1} \exp\left(-\left(\frac{u}{A}\right)^k\right) P(u)\,du \tag{6.2}$$

As a general rule, this integral cannot be computed analytically and numerical methods must be used.

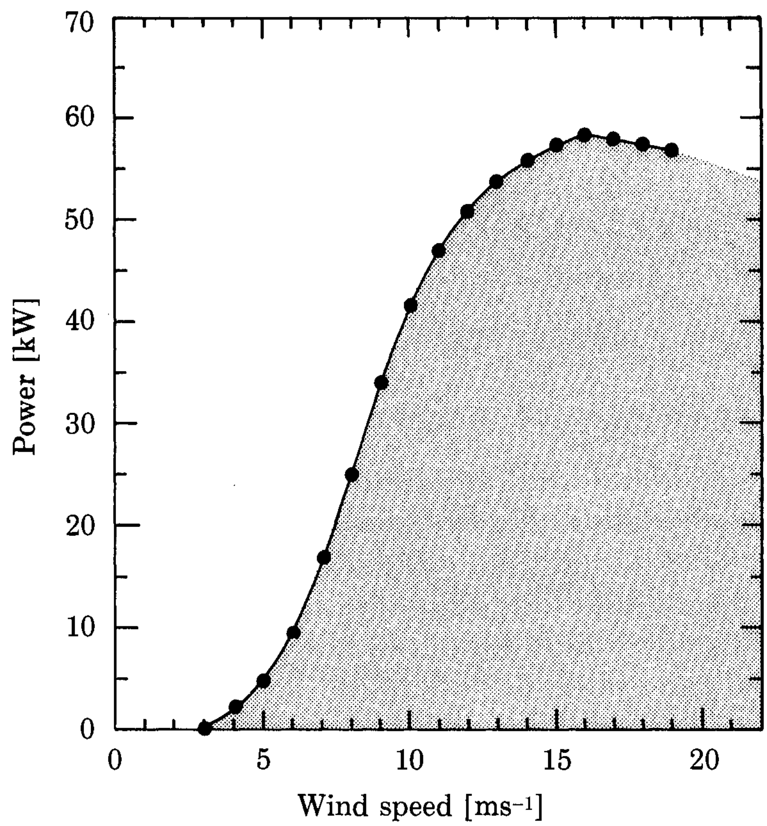


Figure 6.1: Measured power curve of a 55 kW wind turbine. The power curve is plotted as a piecewise linear curve with nodes for every 1 m s^{-1}.

Actual power curves are rather smooth and can be well approximated by a piecewise linear function with a few nodes. Using this approximation, the power can be written as:

$$P(u) = \frac{P_{i+1} - P_i}{u_{i+1} - u_i}(u - u_i) + P_i, \qquad u_i \leq u < u_{i+1} \tag{6.3}$$

which allows for an analytical solution of Eq. 6.2 (Petersen et al., 1981), viz.

$$P = \sum_i \frac{P_{i+1} - P_i}{\alpha_{i+1} - \alpha_i}\Big(G_k(\alpha_{i+1}) - G_k(\alpha_i)\Big) \tag{6.4}$$

where $\alpha_i = u_i/A$. The function $G_k(\alpha)$ is $1/k$ times the incomplete gamma function of the two arguments $1/k$ and α^k. The function is tabulated in Appendix B, Table B.7, for a range of k values. In some situations a discontinuity can be found in the power curve (shown in Fig. 6.2 at $u_5 = u_6$). In case of a jump in power from P_i to P_{i+1} at $u_i = u_{i+1}$, the contribution to the sum from this interval becomes:

$$(P_{i+1} - P_i) \cdot \exp\left(-\alpha_i^k\right) \tag{6.5}$$

By using Eqs. 6.4 and 6.5 the mean power can be theoretically calculated for any power curve simply by dividing it into a sufficient number of linear sections. In practice, the method will only be useful if the power curve can be approximated by a small number of linear sections.

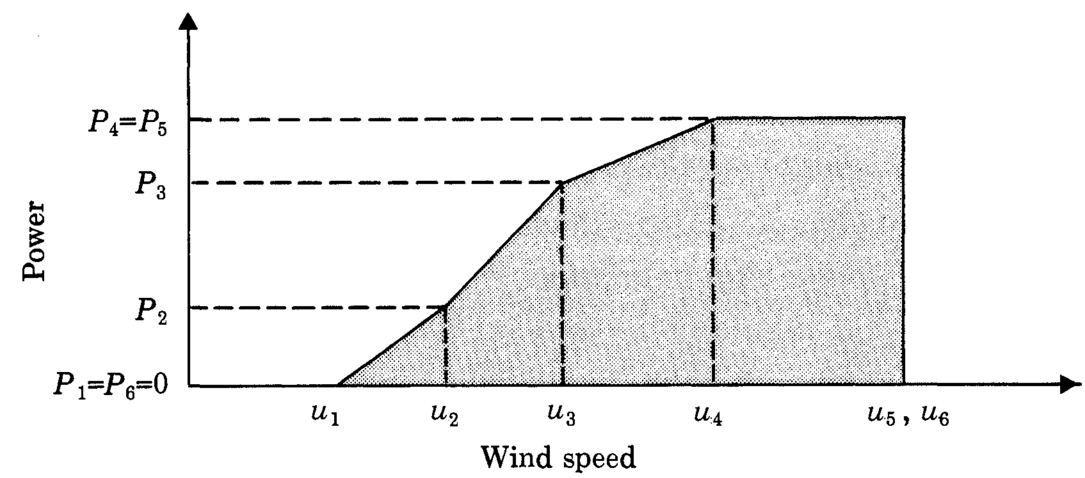


Figure 6.2: Example of a power curve approximated by a piecewise linear function.

For many wind turbines the power curve is reasonably well approximated by the simple shape shown in Fig. 6.3, in which case Eqs. 6.4 and 6.5 give:

$$P = \frac{P_{max}}{\alpha_2 - \alpha_1}\left\{G_k(\alpha_2) - G_k(\alpha_1) - \exp\left(-\alpha_3^k\right)\right\} \tag{6.6}$$

In practice, the last term can often be neglected since very high wind speeds, during which the turbine must be stopped, occur very infrequently.

For a wind turbine with a power curve close to linear, Eq. 6.6 provides a rapid method for calculating the production of a specific wind turbine for various choices of A and k. Hence, an uncertainty interval for A and k can be transformed into an uncertainty interval for the power production.

Approximating a power curve by a simple linear function should be done with care, in order to avoid unnecessarily large errors in the power predictions. For example, if the power curve shown in Fig. 6.1 is approximated by a linear curve from 0 kW at 3 m s^{-1} to 55 kW (the rated power) at 12 m s^{-1} and the Weibull parameters A and k are 6.4 m s^{-1} and 2.0, respectively, a production of 149 MWh per year is predicted. Using the actual power curve leads to a prediction of 112 MWh per year, i.e. the production is overestimated by 33% using the simple linear curve. A more accurate procedure is to use the wind speed u_m at which the efficiency is at maximum (see Section 6.4). The cut-in wind speed is then $\frac{2}{3}u_m$. For the same power curve this gives u_m = 7.3 m s^{-1}, u_1 = 4.9 m s^{-1}, u_2 = 11.8 m s^{-1}, and the prediction becomes 107 MWh per year, less than 5% off the correct value.

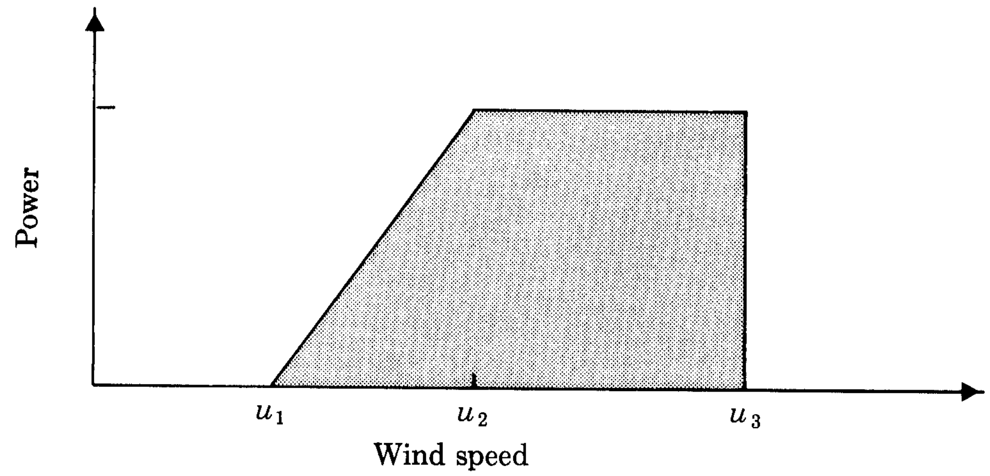


Figure 6.3: A simple linear power curve.

Example 6.1 A small wind turbine is to be placed at a given site. The power curve for the turbine is found to correspond to the simple linear shape with the parameters:

cut-in wind speed	u_1	=	5 m s^{-1}
wind speed at rated power	u_2	=	12 m s^{-1}
rated power	P_{max}	=	50 kW

The Weibull parameters at hub height are estimated as $A = 6 \text{ m s}^{-1}$ and $k = 2$ which gives:

$$\begin{aligned} \alpha_1 &= 0.83 & G_k(\alpha_1) &= 0.673 \\ \alpha_2 &= 2.00 & G_k(\alpha_2) &= 0.882 \\ \alpha_2 - \alpha_1 &= 1.17 \end{aligned}$$

from which the mean power can be calculated as:

$$P = 50\,\text{kW} \cdot \frac{1}{1.17}(0.882 - 0.673) = 8.9 \text{ kW}$$

Repeating the calculations for $A = 6 \pm 1 \text{ m s}^{-1}$ and $k = 1.5$, 2.0 and 2.5, gives the following mean powers (kW):

A [m s^{-1}]	$k = 1.5$	$k = 2.0$	$k = 2.5$
5	6.9	5.0	3.8
6	10.6	8.9	7.8
7	14.3	13.3	12.6

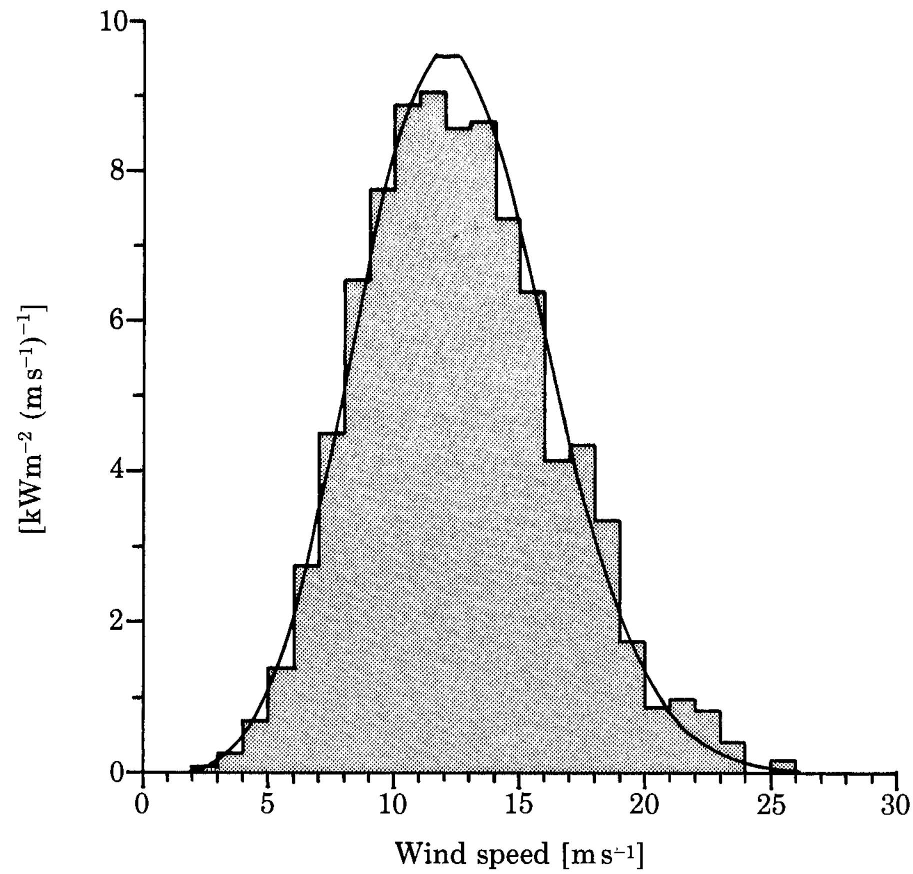


Figure 6.4: Power density function for the Sprogø mast, Denmark at a height of 68 m. The histogram gives the power densities calculated from the data; the smooth curve corresponds to a Weibull fit to the data with the parameters $A = 9.2$ m s^{-1} and $k = 2.31$.

Effects of air density and turbulence

The available mean power density is given by Eq. 5.3 where air density is the appropriate climatological mean value taking into account that the density of air changes with temperature and air pressure (altitude). Furthermore, the power curve $P(u)$ for any given wind turbine depends on air density. The power curve is usually referred to a standard density of 1.225 kg m^{-3} corresponding to conditions of standard sea level pressure and a temperature of 15°C. A power curve applied to a site where the average air density is different from the standard value is commonly assumed to be proportional to the ratio of the site air density to the standard value. This is generally acceptable due to the rather limited range of air densities encountered (see Appendix B, Table B.1). For wind turbines where the power output is used for control, as is the case for most pitch-regulated turbines, the correct calculation of mean power output may be more involved.

The use of 10-min averages of wind speed rather than the instantaneous wind leads to underestimation of the available wind power density because the contribution from wind fluctuations on a time scale of less than 10 minutes is not taken into account. It is shown in Chapter 8 that the underestimation is related to the turbulence intensity and can be approximated by a correction term equal to $3[\ln(z/z_0)]^{-2}$. This expression is valid for high wind conditions over flat homogeneous terrain only. Even for relatively high winds, turbulence intensities can differ significantly due large surface heat fluxes and surface inhomogeneities. This can be important for example at coastal sites. In complex terrain, in particular where the slopes exceed 20%, turbulence intensities depend strongly on the precise location relative to areas of flow acceleration and deceleration.

It should however be stressed that in most cases where calculations are made for sizeable wind turbines, the contribution of turbulence to the power density should *not* be added to the estimate provided by the Atlas. There are three main reasons for this. Firstly, the rotor system has a finite response time, the magnitude of which is dependent on the control system and how rapidly circulation builds up on the blades. Secondly, the calculation of power density applies to a single point whereas the extraction of the total power density involves the effect of simultaneous winds over the entire rotor disk. Hence, due to the spatial extent of the rotor and the lack of lateral and vertical coherence in the wind field much of the effect of turbulence is filtered out. Thirdly, when estimating the power from a specific wind turbine it is necessary to use the measured power curve for the turbine in question, and it is generally accepted that power curves should refer to 10-min averages (Frandsen et al., 1982, 1989). Therefore the power curve itself contains part of the contribution of turbulence to the power density, the magnitude being dependent on the actual turbine and on the terrain where the power curve was measured. The uncertainties associated with establishing and applying power curves are often large, 10% or more (see e.g. Christensen and Dragt, 1986; Frandsen, 1987).

In conclusion, it may not be necessary to correct the power estimates obtained by means of the Atlas for the effect of turbulence when calculations are made for flat or undulating terrain of roughness classes 0, 1, and 2. For greater values of roughness and for orography with steep slopes where separation occurs, it might be necessary to make corrections with respect to high turbulence intensities. Special consideration should then be given to the use of power curves determined in areas characterized by low turbulence intensities.

6.2 Power density function

Sometimes it is of interest to evaluate the contribution of different ranges of wind speed to the power production. A very simple estimate can be made by evaluating the mean power in the wind for different wind speeds. The mean power density is given as:

$$E(u) = \frac{1}{2}\rho u^3 \cdot f(u) \tag{6.7}$$

where $f(u)$ is the estimated Weibull distribution corresponding to the location. A graph of this function gives a picture of which wind speeds are important for the mean power production. An example is shown in Fig. 6.4. The function reaches its maximum at wind speed:

$$u = A\left(\frac{k+2}{k}\right)^{1/k} \tag{6.8}$$

6.3 Power duration curve

From the Weibull parameters and the power curve it is possible to calculate the probability Pr that the power will exceed a certain value P. The corresponding curve is called the power duration curve. For the simple linear power curve shown in Fig. 6.3 this probability is given by:

$$Pr(\text{power} > P) = \exp\left(-\left(\frac{u_p}{A}\right)^k\right), \qquad 0 \le P \le P_{max} \tag{6.9}$$

with

$$P = \frac{P_{max}}{u_2 - u_1}(u_p - u_1) \quad \text{or} \quad u_p = u_1 + \frac{P}{P_{max}}(u_2 - u_1) \tag{6.10}$$

The power duration curve then becomes:

$$Pr(\text{power} > P) = \exp\left[-\left(\alpha_1 + \frac{P}{P_{max}}(\alpha_2 - \alpha_1)^k\right)\right] \tag{6.11}$$

6.4 Optimization of power production

The amount of wind energy available for power production varies greatly over Europe. It also varies considerably from region to region and within regions. When a site has been selected and a proper siting accomplished - resulting in a Weibull distribution function for the wind speed - the next step is to decide upon an appropriate wind turbine. Due to the large variations in wind climate, one should ensure that the chosen wind turbine design is the best possible for the particular location.

The traditional procedure is to calculate the mean production from one or more available turbines following the method described in Section 6.1. This, however, does not ensure that the selected turbine gives optimum production at the site as the turbine may have been designed for another wind regime.

The efficiency of a wind turbine is defined as the ratio of the actual power output at a given wind speed to the total available power which passes through the swept area. It is evident that the best utilization of the energy in the wind can be obtained when the turbine efficiency reaches its highest value at a point close to the maximum of the power density function of the wind. Thus the aerodynamic efficiency curve of the wind turbine should be matched to the wind speed distribution. A simplified procedure is presented below.

Assuming a wind turbine with a simple linear power curve the efficiency curve becomes:

$$C_p(u) = \frac{P(u)}{E(u) \cdot A_R} = \frac{s(u - u_1)}{\frac{1}{2}\rho u^3 \cdot A_R}, \qquad u_1 \le u \le u_2 \tag{6.12}$$

where $P(u)$ is the power output at wind speed u, $E(u) \cdot A_R$ is the total available power passing the swept area, A_R is the swept area and s is the slope of the power curve:

$$s = \frac{P_{max}}{u_2 - u_1} \tag{6.13}$$

The maximum efficiency occurs at wind speed u_m, which can be determined by differentiating Eq. 6.12, leading to:

$$u_m = \frac{3}{2} u_1 \tag{6.14}$$

The power curve can now be written as:

$$P(u) = \frac{3}{2}\, \rho C_p(u_m) A_R \cdot u_m^2 \left(u - \frac{2}{3} u_m\right) \quad \text{for} \quad u_1 \le u \le u_2 \tag{6.15}$$

Substituting this expression into the expression for the mean power, Eq. 6.6, yields the result:

$$P = \frac{1}{2}\,\rho C_p(u_m) A_R \cdot A^3 \left[3 \left(\frac{u_m}{A} \right)^2 \cdot \left\{ G_k \left(\frac{u_2}{A} \right) - G_k \left(\frac{2}{3}\frac{u_m}{A} \right) \right\} \right] \tag{6.16}$$

This expression contains parameters which describe the main characteristics of the wind turbine:

A_R = swept area
$C_p(u_m)$ = maximum efficiency
u_m = wind speed at which the efficiency is maximum
u_2 = wind speed at which the rated power is reached

The value of u_m which optimizes the mean power P can be approximated with sufficient accuracy by the expression:

$$u_m = A \left[\left(\frac{k+2}{k} \right)^{1/k} - 0.15 \right] \tag{6.17}$$

The first term in the parenthesis gives the wind speed scaled with A at which there is a maximum power density function for the wind, Eq. 6.8. The expression thus shows that the maximum efficiency should be chosen at a wind speed somewhat lower than that corresponding to the maximum in the power density function of the wind.

The procedure may be used to guide the selection of the appropriate wind turbine.† It has, however, two shortcomings. Firstly, to design a wind turbine for a specific wind climate involves not only the location of the efficiency maximum, but also the detailed shape of the efficiency curve (efficiency as a function of the wind speed). Secondly, the question is usually not whether a wind turbine can be designed to optimize the power production at the site, but rather whether an existing wind turbine type with a certain rotor can be modified in order to improve the power production.

For a stall-regulated wind turbine with a given rotor the simplest modifications are: a change of the rotational speed by changing the gearbox ratio, a change of the tip pitch angle and a change of the generator size.

†The remaining part of this chapter was provided by Peter Hauge Madsen, Risø National Laboratory.

The effect on the power performance of a change in the rotational speed or the tip pitch angle of a stall-regulated machine with a hub height of 30 m and a rotor diameter of 23 m is illustrated in Figs. 6.5 and 6.6. The figures show the aerodynamic power curve and the efficiency curves for variations around the design values: 0 degree tip pitch angle and 47.5 rpm rotational speed. Whereas a change in the rotational speed merely shifts the efficiency curve with respect to the wind speed, a change in the tip pitch angle also changes the shape of the efficiency curve. In both cases the peak power and thus the generator size is influenced.

The annual energy production given the different power curves is calculated from Eq. 6.1. The annual energy production (without losses in the transmission system) for the wind turbine in its design configuration is given in Table 6.1 for three different wind climates.

Table 6.1: Annual energy production for three wind climates, 0 degree tip pitch angle, 47.5 rpm rotational speed.

A $\mathrm{m\,s^{-1}}$	k	Ann. energy prod. MWh
6.0	1.9	251
7.5	1.9	454
9.0	1.9	666

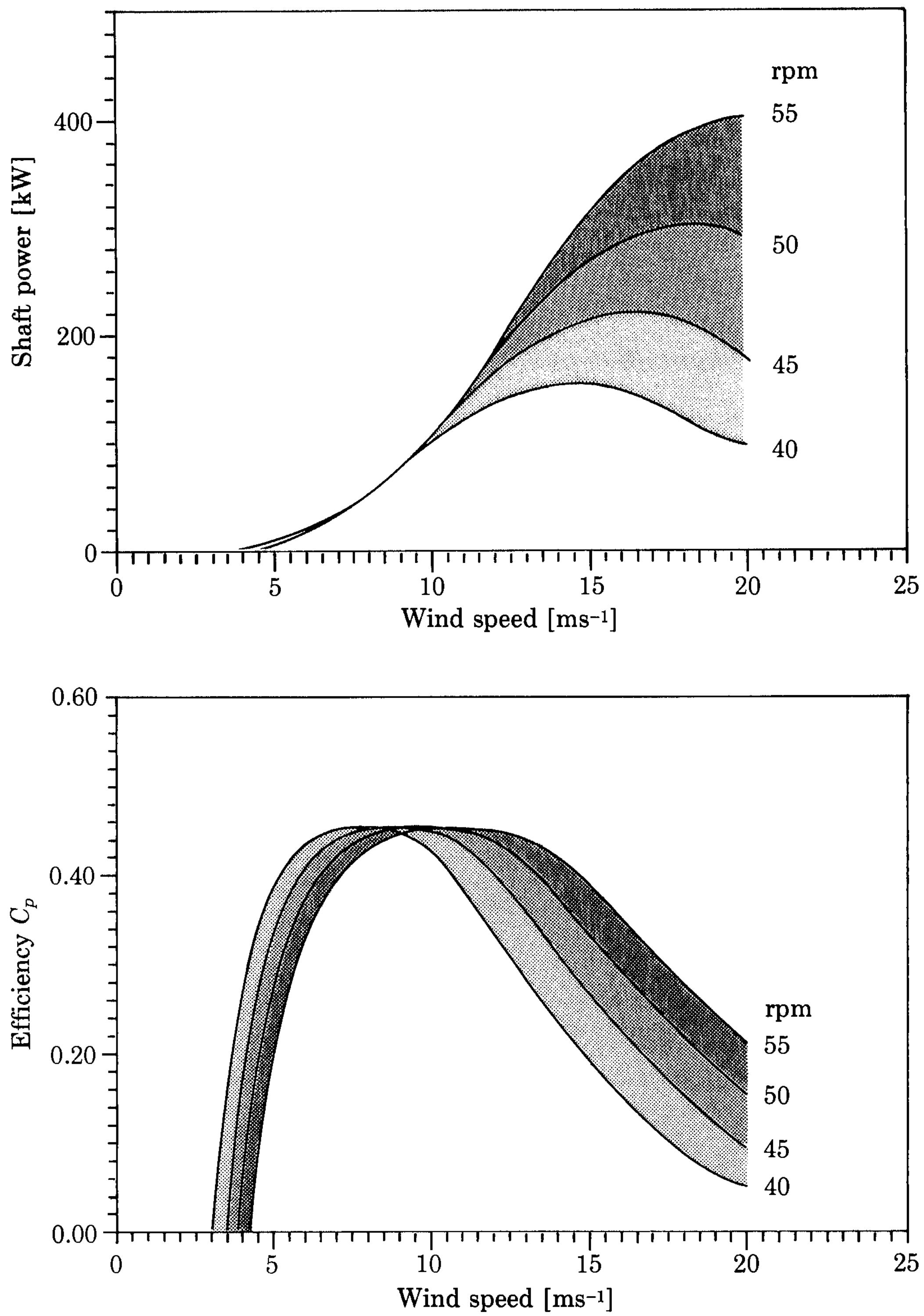


Figure 6.5: The effect on power performance of changes in the rotational speed (rpm: rotations per minute). The wind turbine is stall regulated with a hub height of 30 m and a rotor diameter of 23 m. Tip pitch angle is 0 degrees. Upper figure shows aerodynamic power curves; lower figure shows aerodynamic efficiency curves.

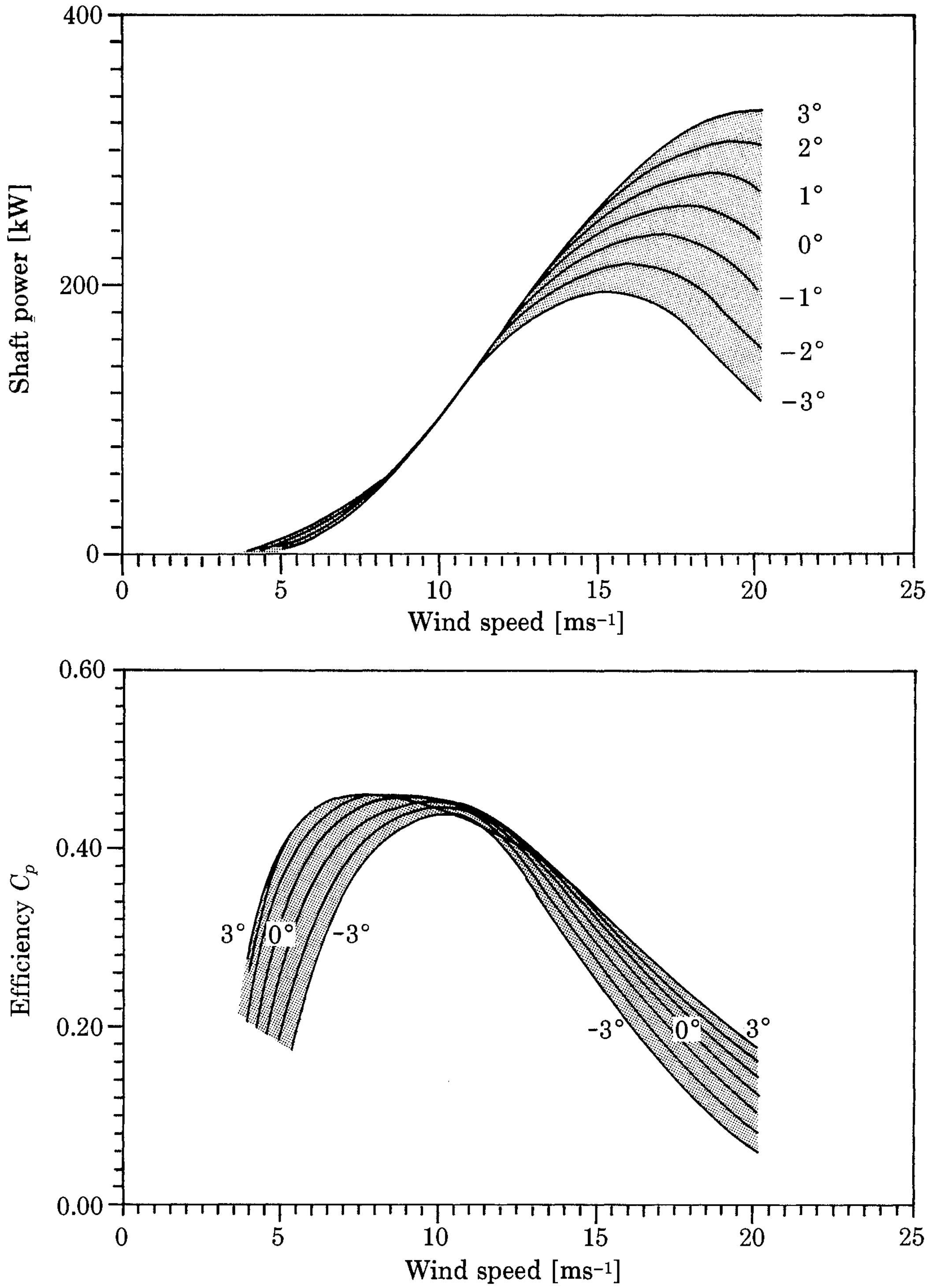
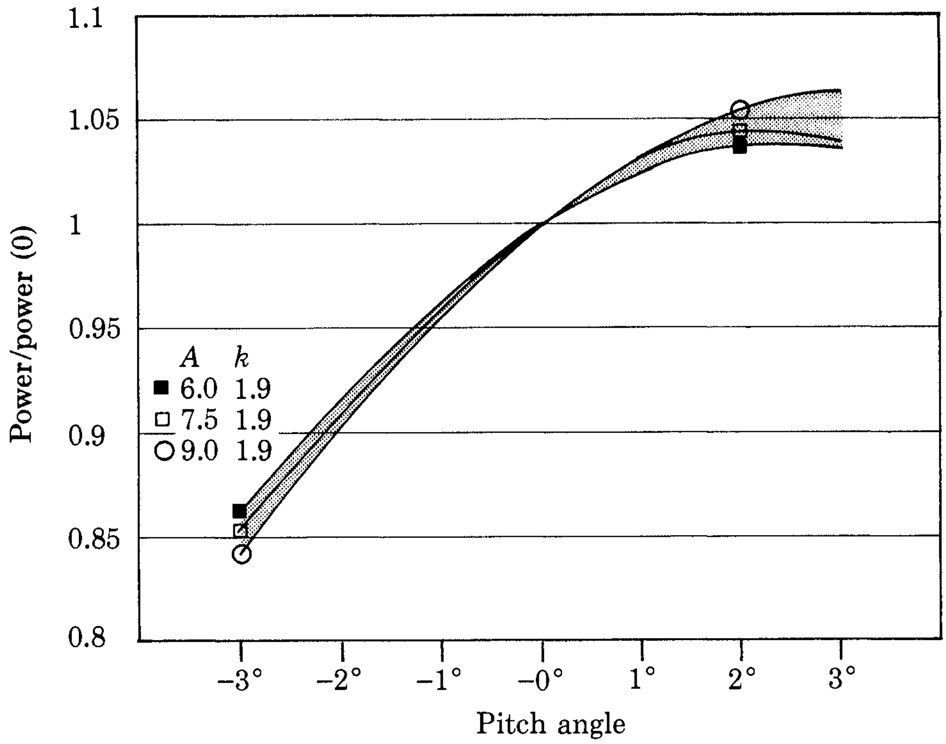


Figure 6.6: The effect on power performance of changes in tip pitch angle θ [°]. The wind turbine is stall regulated with a hub height of 30 m and a rotor diameter of 23 m. The rotational speed is 47.5 rpm. Upper figure shows aerodynamic power curves; lower figure shows aerodynamic efficiency curves.

The variations in the annual energy production for changes in tip pitch angle and rotational speed are shown in Fig. 6.7. It is seen that only insignificant gains in the energy production are possible for the low wind regime whereas for the high wind regime substantial improvements can be obtained.



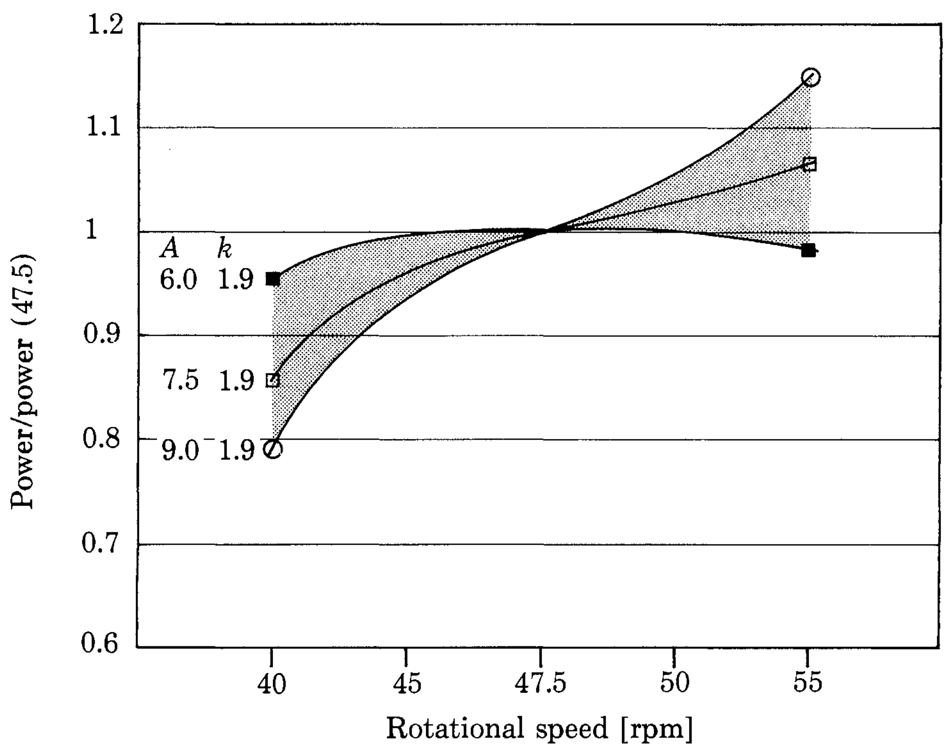


Figure 6.7: Variation of power production for changes in tip pitch angle (upper figure) and rotational speed (lower figure). The wind turbine is the same as in Figs. 6.5 and 6.6. The power production is shown for three different wind-climatological conditions given by the three sets of Weibull parameters A and k.

The adjustments have consequences for the wind turbine loading. Figure 6.8 shows the thrust from the wind turbine rotor to the tower as a function of wind speed. Note that especially a change in rotational speed significantly increases the thrust.

Modifications to the design configuration should therefore be followed by a structural strength verification and possibly a reinforcement of the blades etc. Thus the optimization of a wind turbine to a specific wind climate is an economic optimization where improvements in the annual energy production are balanced against the costs of the structural changes, a larger generator and gearbox etc.

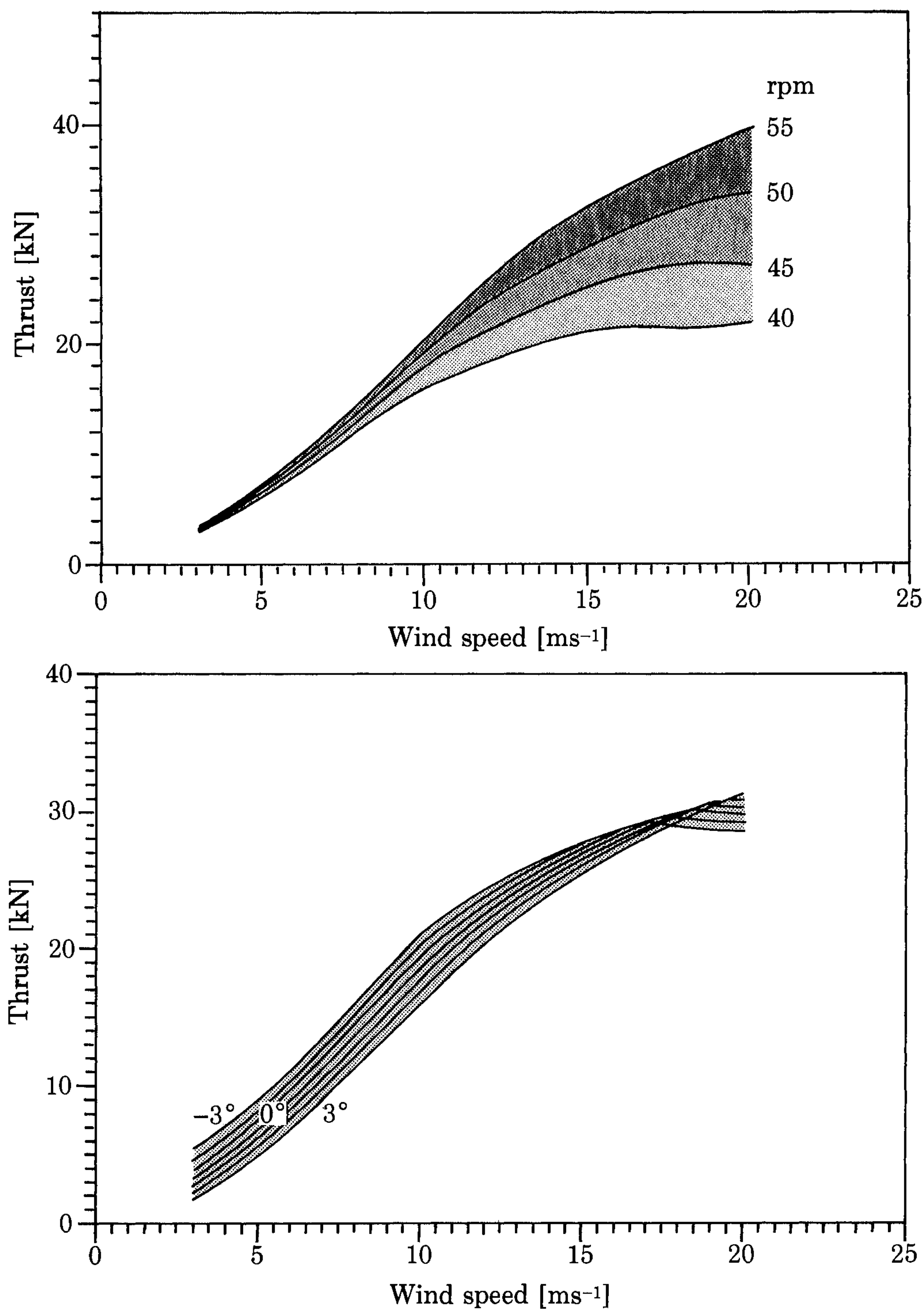


Figure 6.8: Wind turbine loading as a function of wind speed, for different rotor speeds and tip pitch angles. The wind turbine is the same as in Figs. 6.5 and 6.6. Upper figure shows thrust for varying rotor speeds and a fixed pitch angle of 0°. Lower figure shows thrust for varying pitch angles and a fixed rotational speed of 47.5 rpm.

Chapter 7

Station statistics and climatologies

In this chapter, the climatological data for the meteorological stations used in the study are presented in tables and graphs. For each station, the tables give the calculated *regionally representative* wind climatology obtained from the station data by applying the Wind Atlas analysis, together with a summary of the raw data and the measuring conditions. The raw data and some derived quantities are furthermore shown graphically in wind climatological fingerprints at the end of each country section.

The countries are arranged alphabetically throughout the chapter, viz.

1. Belgium	7. Italy
2. Denmark	8. Luxembourg
3. France	9. Netherlands
4. Germany (FRG)	10. Portugal
5. Greece	11. Spain
6. Ireland	12. United Kingdom

and the stations are listed alphabetically within each country. Each station summary is printed on a pair of facing pages. The left-hand page of an opening contains

- a station description
- a raw data summary

and the right-hand page gives

- the calculated regional Weibull parameters
- the calculated regional mean wind speeds and energies

The presentation of the data is explained in detail in the following sections.

7.1 The station description and statistical tables

Station description

The station description comprises the geographical location, a description of the setting and surroundings of the station, and a station roughness rose.

Name of station The names of the stations are those used in the language of each country and they are spelled accordingly.

Geographical coordinates The latitude and longitude of each station is given in degrees, minutes and seconds - usually to the nearest full minute. A list of the geographical coordinates of all the stations is provided in Table 7.1.

UTM coordinates The UTM (Universal Transverse Mercator) coordinates consist of the UTM zone number and Easting and Northing in full metres. These coordinates have been calculated as the exact UTM coordinates corresponding to the geographical coordinates given. Thus, the resolution of these coordinates does *not* pertain to the actual location of the station. Geodetic datum: European Datum 1950.

Altitude The elevation of the station is given in metres above mean sea level (m a.s.l.).

Station description The overall setting of each station is described, i.e. major terrain features such as distance from the sea, lakes, rivers, forests, mountains, etc. Major obstacles close to the anemometer may also be mentioned as well as other information regarded as significant for the interpretation of the station statistics.

Roughness rose The roughness lengths [m] assigned to the surrounding land surface are listed for each of the twelve 30°-sectors. The distance to and magnitude of roughness changes within a sector are also listed. Furthermore, the wind speed correction factors and wind direction correction angles - to allow for sheltering obstacles and the effect of orographic forcing - applied in the calculation of the Wind Atlas tables are given in a separate table adjacent to the roughness rose. If a station has been corrected for sheltering only, there are no corrections to the wind directions.

Raw data summary

Distribution of wind measurements This table gives the sectorwise distribution of the raw wind speed measurements and the distribution of wind speeds within each sector. The frequency of occurrence of the winds in the sectors is given in per cent, whereas the distribution of wind speeds is given in per mille (tenths of per cent), i.e. normalized to 1000 within each sector. The table pertains to the anemometer height in metres above ground level (m a.g.l.) and the measurement period listed above the table. Note that the format of the time given is YeMoDaHo, e.g. 83123121 means December 31, 1983, at 21:00.

A Weibull distribution function has been fitted to the wind speed distribution in each sector. The resulting Weibull A- [$\mathrm{m\,s^{-1}}$] and k-parameters are listed in the last two columns of the table.

Daily and annual variation of wind speed This table gives the mean wind speed as a function of time of day and month of year. The time of day is given as Coordinated Universal Time (UTC), equivalent to GMT.

Regional climatology and mean values

The Wind Atlas tables These tables give the calculated Weibull A- and k-parameters for 12 sectors, 5 heights and 4 roughness classes. In addition, the sectorwise distribution of wind speed is given in per cent for each roughness class. The Weibull A-parameter is given in [$\mathrm{m\,s^{-1}}$].

Estimated mean wind speed and mean power The last table on the right-hand page gives the estimated (calculated) mean wind speed [$\mathrm{m\,s^{-1}}$] and total mean power of the wind [$\mathrm{W\,m^{-2}}$] for each of the five standard heights and four roughness classes. These are calculated using the Weibull parameters of the Wind Atlas tables.

7.2 The wind climatological fingerprints

The purpose of the graphical presentations of wind data at the end of each national section is to give a compact and informative overview of the wind data used for the Atlas. The first line states the name of the meteorological station, the country, and the period over which the data were collected. This is followed by the height above ground level where measurements were taken, the mean value, the standard deviation and the mean value of the cube of the measured wind speeds. The graphical presentation consists of five graphs:

The mean year The average seasonal variation of the measured wind speed (full line) and cube of wind speed (dashed line) is shown in the top left graph. All data associated with the same calendar month are averaged and the results plotted at the midpoint in each of the indicated monthly intervals. The unit on the ordinate is $\mathrm{m\,s^{-1}}$ for mean speeds and $\mathrm{m^3s^{-3}}$ for the mean of the cube of the wind speed. Values read from the graph must be multiplied by the scale factor given to the right. The continuous curves are obtained by interpolation using a periodic cubic spline. The speed data are also contained in the tables on the station description pages.

The mean days The average daily variation of the measured wind speed for the months of January and July is shown in the top right graph. The average hourly variation of wind speed is shown in full lines for January and July and for the cube of wind speed dashed lines are used. Data from all months of January (July) associated with the same time of day are averaged. Results obtained for each of the indicated standard hours (UTC) are plotted using an interpolating smooth curve (periodic cubic spline). The mean ordinate for each curve is identical to the ordinate on the corresponding mean year curve (top left graph) at the January (July) points. The unit on the ordinate is $\mathrm{m\,s^{-1}}$ for mean speeds and $\mathrm{m^3s^{-3}}$ for the mean of the cube of speed. Values read from the graph must be multiplied by the scale factor given to the left. Mean days for each calendar month are calculated and define - for each calendar month - a mean or reference day which is used as reference in calculating the spectrum below. The speed values are contained in the tables in the station descriptions.

The wind rose The relative frequencies of winds coming from each of twelve sectors are shown in the middle left graph as the radial extent of the circle segments spanning the sectors (thick lines). The contribution from each sector to the total mean speed and to the total mean cube of speed are given as the narrower segments and the central segments respectively. For each quantity the normalization is such that the largest segment extends to the outer dotted circle. The corresponding value for each of the three quantities is given in the small box in per cent (numbers given to the nearest integer). The inner dotted circle corresponds to half of this value.

The spectrum The contribution to the total variance of wind speed for a range of periods is shown by the full curve in the middle right graph. The vertical scale is arbitrarily adjusted to centre the curve. The abscissa gives the periods on a logarithmic scale. The curve is calculated from the total time series by first subtracting the monthly mean day values from each day data, hour by hour. The monthly mean days for all twelve months were calculated as described for January and July above. The mean days are in this context considered deterministic in contrast to the calculated time series of deviations which form the stochastic part. This is followed by a Fourier transform of the deviations and the spectral estimates are squared and block averaged over bands of equal relative bandwidth corresponding to the widths of the steps in the curve.

The full vertical bar on the left side gives the contribution to the standard deviation of wind speed in the whole set of data from periods which fit into one year. This is calculated as the standard deviation of the *mean year* (top left). The adjacent dashed bar gives similarly the mean year contribution to the standard deviation of the cube of wind speed. Units are per cent of the total standard deviation of the data. Similarly the bars on the right give the contributions to the standard deviations of speed and cube of speed by periods which fit into one day, i.e. 24, 12, 8 and 6 hours in the present case of basic 3-hourly data. The numbers listed at the top left inside the graph are the contribution to the total standard deviation in per cent by the random variations contained in the variance spectrum, divided into the part with periods longer than one year, periods between one year and one day, and periods smaller than one day (the sum of squares of the contributions of the three random parts together with the contributions from the deterministic mean year and mean day adds to unity). The numbers in the small box below the graph give the relative standard deviation for speed and cube of speed for the mean January day (first two numbers) and the mean July day (last two numbers).

The time print The month-by-month relative deviation from the mean months is shown in the bottom graph. For each month the average speed and cube of speed is calculated and the expected value from the corresponding calendar month in the *mean year* (top left) is subtracted. The relative deviation is shown by the jagged lines - full line corresponding to speed and dashed line corresponding to cube of speed. The smoother full line shows the year-by-year relative deviation of mean speed from the total average. Each point on this curve gives the relative deviation in the period extending backwards and forwards one half year (centred block averages). The centre value for each calendar year thus gives the deviation for that particular year. The open circles show similarly the relative deviation of the mean cube of speed for each calendar year. The numbers to the right give the root mean square of the calendar year deviations in per cent for speed (lower number) and cube of speed (upper number). The vertical scale is linear from −1 to +1, and shifts at +1 to a coarser linear scale which is adjusted to accommodate the largest deviations.

7.3 Station statistics and climatologies

The 190 meteorological stations with surface observations used in the Wind Atlas are listed in Table 7.1. The geographical location and the period for which wind data were available for the study are given for each station. The pages on which the tables and fingerprint for each station can be found are given in the last two columns of the table. For 175 stations both tables and fingerprints are provided; in addition 3 stations are represented by tables only and 12 stations by fingerprints only.

The 29 radiosonde stations used are listed in Table 7.2. The geographical location, observation altitude, and the period for which data have been analysed are listed for each station. The data from the radiosonde stations are presented in tables only. A summary of the observed wind speed distributions is given in Table 7.3.

Table 7.1: Meteorological stations with surface observations used in the Wind Atlas. The EC countries are listed alphabetically as are the stations within each country.

	Latitude	Longitude	Alt. [m]	Period	Table page	Graph page
Belgium						
Florennes	50° 14′ N	04° 39′ E	280	1975-81	118	128
Melsbroek	50° 54′ N	04° 28′ E	36	1970-79	120	128
Middelkerke	51° 12′ N	02° 52′ E	4	1972-81	122	128
Saint Hubert	50° 02′ N	05° 24′ E	556	1971-80	124	129
Spa	50° 29′ N	05° 55′ E	573	1971-80	126	129
Denmark						
Ålborg	57° 06′ N	09° 52′ E	3	1965-72	130	148
Beldringe	55° 29′ N	10° 20′ E	17	1972-79	132	148
Horns Rev Fyrskib	55° 24′ N	07° 34′ E	0	1962-80	134	148
Karup	56° 17′ N	09° 08′ E	52	1971-79	136	149
Kastrup	55° 38′ N	12° 40′ E	5	1965-72	138	149
Rønne	55° 04′ N	14° 45′ E	16	1972-79	140	149
Skrydstrup	55° 14′ N	09° 16′ E	40	1971-79	142	150
Tirstrup	56° 18′ N	10° 37′ E	25	1971-79	144	150
Værløse	55° 46′ N	12° 19′ E	19	1972-79	146	150
France						
Abbeville	50° 08′ N	01° 50′ E	77	1970-78	152	216
Aurillac	44° 53′ N	02° 25′ E	639	1979-85	154	216
Avord	47° 03′ N	02° 39′ E	179	1972-78	156	216
Bordeaux	44° 50′ N	00° 42′ E	51	1970-79	158	216
Brest	48° 27′ N	04° 25′ W	103	1970-79	160	217
Caen	49° 11′ N	00° 27′ E	67	1972-79	162	217
Cambrai	50° 13′ N	03° 09′ E	77	1970-79	164	217
Carcassonne	43° 13′ N	02° 19′ E	130	1973-78	166	217
Cherbourg	49° 39′ N	01° 28′ W	138	1970-78	168	218
Clermont-Ferrand	45° 47′ N	03° 10′ E	332	1976-85	170	218
Dinard	48° 35′ N	02° 04′ W	59	1970-79	172	218
Evreux	49° 01′ N	01° 13′ E	146	1970-79	174	218
Gourdon	44° 45′ N	01° 24′ E	261	1970-79	176	219
Istres	43° 31′ N	04° 56′ E	24	1970-79	178	219
Le Puy Chadrac	45° 03′ N	03° 54′ E	715	1976-82	180	219
Limoges	45° 52′ N	01° 11′ E	402	1973-79	182	219
Lorient	47° 46′ N	03° 27′ W	44	1970-78	184	220
Lyon	45° 43′ N	04° 57′ E	201	1970-79	186	220
Millau	44° 07′ N	03° 01′ E	720	1970-79	188	220
Mont Aigoual	44° 07′ N	03° 35′ E	1565	1970-79	190	220
Mont de Marsan	43° 55′ N	00° 30′ E	63	1970-79	192	221
Nantes	47° 10′ N	01° 37′ W	27	1970-79	194	221
Nîmes	43° 45′ N	04° 25′ E	96	1970-79	196	221

	Latitude	Longitude	Alt. [m]	Period	Table page	Graph page
Orléans	47° 59′ N	01° 45′ E	125	1970-79	198	221
Perpignan	42° 44′ N	02° 52′ E	48	1972-78	200	222
Poitiers	46° 35′ N	00° 19′ E	120	1970-78	202	222
Reims	49° 18′ N	04° 02′ E	99	1970-78	204	222
Saint Etienne	45° 32′ N	04° 18′ E	402	1975-84	206	222
Saint Yan	46° 25′ N	04° 01′ E	244	1975-84	208	223
Toul	48° 47′ N	05° 59′ E	298	1975-79	210	223
Toulouse	43° 32′ N	01° 22′ E	166	1970-79	212	223
Vichy	46° 10′ N	03° 24′ E	251	1977-85	214	223
Germany (FRG)						
Berlin	52° 28′ N	13° 24′ E	48	1971-80	224	254
Braunschweig	52° 18′ N	10° 27′ E	81	1973-81	226	254
Bremen	53° 03′ N	08° 47′ E	3	1970-79	228	254
Düsseldorf	51° 17′ N	06° 47′ E	37	1970-79	230	254
Frankfurt	50° 02′ N	08° 36′ E	111	1971-80	232	255
Hamburg	53° 38′ N	09° 59′ E	13	1970-79	234	255
Hannover	52° 27′ N	09° 42′ E	51	1970-79	236	255
Helgoland	54° 11′ N	07° 54′ E	4	1971-80	238	255
Hof-Hohensaas	50° 19′ N	11° 53′ E	567	1971-80	240	256
List/Sylt	55° 01′ N	08° 25′ E	26	1971-80	242	256
München	48° 08′ N	11° 43′ E	527	1970-79	244	256
Nürnberg	49° 30′ N	11° 05′ E	310	1971-80	246	256
Saarbrücken	49° 13′ N	07° 07′ E	323	1971-80	248	257
Stuttgart	48° 41′ N	09° 13′ E	373	1972-81	250	257
Weißenburg	49° 01′ N	10° 58′ E	422	1971-80	252	257
Greece						
Araxos	38° 13′ N	21° 22′ E	15	1974-75	258	-
Athina	37° 54′ N	23° 44′ E	28	1974-83	260	278
Chios	38° 22′ N	26° 08′ E	5	1974-83	-	278
Heraklion	35° 20′ N	25° 08′ E	37	1974-83	262	278
Kerkyra	39° 37′ N	19° 55′ E	2	1974-83	264	278
Limnos (Agio Sozon)	39° 29′ N	25° 13′ E	47	1986-87	266	-
Limnos (Airport)	40° 06′ N	24° 30′ E	5	1974-75	268	-
Methoni	36° 49′ N	21° 42′ E	33	1974-83	-	279
Milos	36° 45′ N	24° 26′ E	182	1974-83	-	279
Mytilini	39° 06′ N	26° 33′ E	17	1974-83	270	279
Naxos	37° 00′ N	25° 23′ E	9	1974-83	272	280
Rodos	36° 23′ N	28° 07′ E	4	1974-83	274	280
Thessaloniki	40° 31′ N	22° 58′ E	8	1974-83	276	280
Ireland						
Belmullet	54° 14′ N	10° 00′ W	9	1966-75	282	302
Claremorris	53° 43′ N	08° 59′ W	69	1967-77	284	302

	Latitude	Longitude	Alt. [m]	Period	Table page	Graph page
Cork	51° 51′ N	08° 29′ W	162	1970-79	286	302
Dublin	53° 26′ N	06° 15′ W	65	1970-79	288	302
Kilkenny	52° 40′ N	07° 16′ W	63	1970-79	290	303
Malin Head	55° 22′ N	07° 20′ W	24	1970-79	292	303
Mullingar	53° 32′ N	07° 21′ W	101	1974-83	294	303
Roches Point	51° 48′ N	08° 15′ W	40	1970-79	296	304
Shannon	52° 41′ N	08° 55′ W	8	1970-79	298	304
Valentia	51° 56′ N	10° 15′ W	18	1970-79	300	304
Italy						
Alghero	40° 38′ N	08° 17′ E	40	1960-69	306	360
Bolzano	46° 28′ N	11° 20′ E	241	1966-75	308	360
Brindisi	40° 39′ N	17° 57′ E	15	1965-75	310	360
Cagliari	39° 15′ N	09° 03′ E	18	1951-70	312	360
Campeda	40° 21′ N	08° 45′ E	660	1980-86	314	361
Campo Marino	41° 56′ N	15° 01′ E	100	1985-88	-	361
Campolieto	41° 37′ N	14° 47′ E	970	1985-88	-	361
Capo Bellavista	32° 56′ N	09° 43′ E	138	1960-69	316	361
Capo Palinuro	40° 01′ N	15° 17′ E	184	1960-69	318	362
Capo Sandalo	39° 09′ N	08° 14′ E	100	1981-86	320	362
Capracotta	41° 50′ N	14° 15′ E	1370	1984-88	-	362
Cingoli	43° 23′ N	13° 12′ E	815	1984-88	-	362
Cirras	39° 49′ N	08° 34′ E	5	1980-85	322	363
Fiume Santo	40° 51′ N	08° 18′ E	50	1981-85	324	363
Frosolone	41° 36′ N	14° 27′ E	1360	1984-88	-	363
Gioia del Colle	40° 41′ N	16° 56′ E	350	1965-75	326	363
Grosseto	42° 45′ N	11° 04′ E	7	1965-75	328	364
Le Porte	42° 21′ N	10° 55′ E	380	1983-87	330	364
Lecce Galatina	40° 39′ N	17° 57′ E	48	1965-75	332	364
Macerata	43° 18′ N	13° 27′ E	350	1984-88	-	364
Mazara	37° 40′ N	12° 35′ E	40	1983-87	-	365
Milano	45° 26′ N	09° 17′ E	103	1966-75	334	365
Monte Arci	39° 45′ N	08° 48′ E	780	1980-85	336	365
Nago	45° 50′ N	10° 54′ E	170	1984-87	-	365
Olbia	40° 56′ N	09° 30′ E	2	1959-68	338	366
Pisa	43° 41′ N	10° 23′ E	2	1965-75	340	366
Ponza	40° 55′ N	12° 57′ E	184	1965-74	342	366
Salcito	41° 47′ N	14° 33′ E	890	1985-88	-	366
San Gavino	40° 32′ N	08° 47′ E	20	1979-85	344	367
San Gilla	39° 13′ N	09° 06′ E	1	1980-85	346	367
Santa Anna	39° 50′ N	08° 41′ E	40	1980-85	348	367
Santa Caterina	39° 06′ N	08° 29′ E	1	1981-86	350	367
Scopeto	42° 23′ N	10° 54′ E	180	1983-86	352	368
Trapani	37° 55′ N	12° 30′ E	7	1970-75	354	368

	Latitude	Longitude	Alt. [m]	Period	Table page	Graph page
Unia	40° 50′ N	08° 20′ E	40	1979-85	356	369
Uras	39° 42′ N	08° 42′ E	30	1979-81	358	369
Luxembourg						
Findel	49° 37′ N	06° 12′ E	376	1970-79	370	372
The Netherlands						
Eelde	53° 08′ N	06° 35′ E	5	1970-76	374	386
Eindhoven	51° 27′ N	05° 25′ E	20	1970-76	376	386
Leeuwarden	53° 13′ N	05° 46′ E	0	1970-76	378	386
Schiphol	52° 18′ N	04° 46′ E	−4	1970-76	380	387
Terschelling	53° 21′ N	05° 11′ E	1	1970-76	382	387
Texel Lichtschip	53° 01′ N	04° 22′ E	0	1970-76	384	387
Portugal						
Beja	38° 01′ N	07° 52′ W	246	1971-80	388	418
Bragança	41° 48′ N	06° 44′ W	691	1971-80	390	418
Cabo Carvoeiro	39° 21′ N	09° 24′ W	32	1971-80	392	418
Coimbra	40° 12′ N	08° 25′ W	141	1971-80	394	418
Faro	37° 01′ N	07° 58′ W	8	1971-80	396	419
Ferrel	39° 23′ N	09° 17′ W	20	1977-78	398	419
Flores	39° 27′ N	31° 08′ W	28	1971-80	400	419
Funchal	32° 41′ N	16° 46′ W	49	1971-80	402	419
Lisboa	38° 47′ N	09° 08′ W	103	1971-80	404	420
Porto	41° 14′ N	08° 41′ W	70	1971-80	406	420
Porto Santo	33° 04′ N	16° 21′ W	78	1971-80	408	420
Sagres	36° 59′ N	08° 57′ W	40	1971-80	410	420
Santa Maria	36° 58′ N	25° 10′ W	100	1971-80	412	421
Sines	37° 57′ N	08° 53′ W	15	1973-80	414	421
Viana do Castelo	41° 42′ N	08° 48′ W	16	1971-80	416	421
Spain						
Albacete	38° 56′ N	01° 51′ W	700	1972-82	422	474
Alicante	38° 17′ N	00° 32′ E	30	1972-82	424	474
Almería	36° 51′ N	02° 23′ W	20	1972-82	426	474
Avilés	43° 33′ N	06° 02′ W	100	1972-82	428	474
Badajoz	38° 53′ N	06° 50′ W	185	1972-82	430	475
Barcelona	41° 18′ N	02° 05′ E	5	1972-85	432	475
El Hierro	27° 49′ N	17° 53′ W	31	1973-82	434	475
Fuerteventura	28° 27′ N	13° 51′ W	17	1972-82	436	475
Gerona	41° 54′ N	02° 46′ E	128	1972-82	438	476
Granada	37° 11′ N	03° 47′ W	569	1972-82	440	476
La Coruña	43° 08′ N	08° 23′ W	97	1972-82	442	476
Lanzarote	28° 56′ N	13° 37′ W	20	1972-82	444	476

	Latitude	Longitude	Alt. [m]	Period	Table page	Graph page
Las Palmas	27° 56′ N	15° 23′ W	24	1973-82	446	477
Madrid	40° 25′ N	03° 41′ W	581	1972-85	448	477
Málaga	36° 43′ N	04° 25′ W	7	1972-82	450	477
Menorca	39° 53′ N	04° 15′ E	82	1972-82	452	477
Murcia	37° 58′ N	01° 14′ W	75	1972-82	454	478
Palma de Mallorca	39° 33′ N	02° 44′ E	4	1972-82	456	478
Pamplona	42° 46′ N	01° 39′ W	454	1973-82	458	478
Salamanca	40° 57′ N	05° 30′ W	790	1972-82	460	478
Santiago de Compostela	42° 56′ N	08° 26′ W	364	1972-82	462	479
Sevilla	37° 25′ N	05° 54′ W	27	1972-82	464	479
Tenerife (Los Rodeos)	28° 28′ N	16° 19′ W	605	1972-82	466	479
Tenerife (Reina Sofía)	28° 02′ N	16° 34′ W	72	1978-82	468	480
Valencia	39° 07′ N	00° 28′ E	62	1972-82	470	480
Zaragoza	41° 40′ N	01° 01′ W	247	1972-85	472	480
United Kingdom						
Bala	52° 54′ N	03° 35′ W	163	1975-82	482	526
Benbecula	57° 28′ N	07° 22′ W	6	1970-81	484	526
Birmingham	52° 27′ N	01° 44′ W	94	1970-81	486	526
Blackpool	53° 46′ N	03° 02′ W	10	1972-82	488	526
Bournemouth	50° 47′ N	01° 50′ W	10	1970-81	490	527
Burrington	50° 56′ N	03° 59′ W	201	1977-82	492	527
Cairngorm	57° 13′ N	03° 39′ W	1065	1970-80	494	527
Castle Archdale	54° 28′ N	07° 42′ W	66	1971-81	496	527
Coltishall	52° 45′ N	01° 21′ E	19	1971-80	498	528
Duirinish	57° 32′ N	05° 41′ W	18	1970-80	500	528
Dustaffnage	56° 28′ N	05° 26′ W	3	1971-80	502	528
Eskdalemuir	55° 19′ N	03° 12′ W	249	1970-80	504	528
Exeter	50° 44′ N	03° 25′ W	31	1970-81	506	529
Fort Augustus	57° 08′ N	04° 43′ W	42	1970-81	508	529
London	51° 28′ N	00° 28′ E	24	1973-82	510	529
Lowther Hill	55° 23′ N	03° 45′ E	727	1974-82	512	529
Manchester	53° 21′ N	02° 16′ W	70	1971-80	514	530
Snaefell	54° 18′ N	04° 28′ W	615	1974-82	516	530
Valley	53° 15′ N	04° 32′ W	10	1971-80	518	530
Waddington	53° 10′ N	00° 32′ E	70	1971-80	520	531
Wick	58° 30′ N	03° 06′ E	35	1971-80	522	531
Yeovilton	51° 00′ N	02° 38′ W	17	1971-80	524	531

Table 7.2: Radiosonde stations used in the Wind Atlas. The EC countries are listed alphabetically as are the stations within each country. Altitudes are given in millibars [mb] or metres above mean sea level [m]. Data from Risø, Denmark, were derived from surface pressure observations. ▶

	Latitude	Longitude	Alt.	Period	Table page
Belgium					
Ukkel	50° 48′ N	04° 21′ E	850 mb	1968-80	533
Denmark					
Risø	55° 42′ N	12° 05′ E	surface	1965-77	534
France					
Ajaccio	41° 55′ N	08° 48′ E	1500 m	1961-74	535
Bordeaux	44° 50′ N	00° 42′ W	1500 m	1961-74	536
Brest	48° 27′ N	04° 25′ W	1500 m	1961-74	537
Lyon	45° 44′ N	04° 57′ E	1500 m	1961-74	538
Nancy	48° 41′ N	06° 13′ E	1500 m	1961-74	539
Nantes	47° 10′ N	01° 37′ W	1500 m	1962-75	540
Nîmes	43° 52′ N	04° 24′ E	1500 m	1961-74	541
Toulouse	43° 38′ N	01° 22′ E	1500 m	1962-75	542
Trappes	48° 46′ N	02° 01′ E	1500 m	1961-74	543
Germany (FRG)					
Emden	53° 21′ N	07° 13′ E	850 mb	1961-70	544
Essen	51° 24′ N	06° 58′ E	850 mb	1965-71	545
Hannover	52° 28′ N	09° 42′ E	850 mb	1961-70	546
München	48° 08′ N	11° 43′ E	850 mb	1961-70	547
Schleswig	54° 32′ N	09° 33′ E	850 mb	1961-70	548
Stuttgart	48° 50′ N	08° 12′ E	850 mb	1961-70	549
Greece					
Athina	37° 54′ N	23° 44′ E	850 mb	1974-84	550
Heraklion	35° 20′ N	25° 11′ E	700 mb	1974-84	551
Ireland					
Valentia	51° 56′ N	10° 15′ W	850 mb	1970-79	552
Italy					
Brindisi	40° 39′ N	17° 57′ E	850 mb	1967-73	553
Cagliari	39° 15′ N	09° 03′ E	850 mb	1967-73	554
Roma	41° 48′ N	12° 14′ E	850 mb	1967-73	555
Udine	46° 02′ N	13° 11′ E	850 mb	1967-73	556
United Kingdom					
Aughton	53° 33′ N	02° 55′ W	850 mb	1961-70	557
Camborne	50° 13′ N	05° 19′ W	850 mb	1961-70	558
Crawley	51° 05′ N	00° 13′ W	850 mb	1961-70	559
Hemsby	52° 41′ N	01° 41′ E	850 mb	1961-70	560
Lerwick	60° 01′ N	01° 11′ W	850 mb	1961-70	561
Stornoway	58° 13′ N	06° 20′ W	850 mb	1961-70	562

Florennes

50° 14′ 00″ N 04° 39′ 00″ E	UTM 31 E 617680 m N 5565989 m	280 m a.s.l.

Location in the southern part of the country in the middle of an area limited by the two rivers Sambre and Meuse and by the French border. It is a type 2 terrain with small scattered villages, in a rather forested and undulating region. Seen from the station, woods form the horizon at 1 km or more.
The anemometer is situated in a military airport. Two small nearby buildings act as obstacles to the wind: one is situated to the NE of the anemometer at a distance of about 10 m, the other to the NW at a distance of 25 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.10	1300	0.30	2750	0.20						
30	0.01	750	0.10	1200	0.20								
60	0.01	1500	0.20										
90	0.01	1500	0.20										
120	0.01	500	0.20	3750	0.30								
150	0.01	625	0.10	1500	0.15	3500	0.30						
180	0.01	750	0.30										
210	0.01	900	0.30										
240	0.01	1125	0.30										
270	0.01	2000	0.20										
300	0.01	875	0.20	2000	0.20								
330	0.01	625	0.10	1375	0.30								

Height of anemometer: 6.4 m a.g.l. 75060103-81123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.0	141	162	233	207	141	65	32	12	6	1	0	0	0	0	3.4	1.96
30	7.0	86	119	200	205	181	114	55	24	9	6	1	0	0	0	4.1	2.16
60	7.2	128	172	211	168	128	91	61	31	7	4	0	0	0	0	3.7	1.78
90	7.6	139	298	267	135	70	39	26	16	7	2	0	0	0	0	2.8	1.49
120	5.4	149	198	201	198	131	58	47	14	5	0	0	0	0	0	3.4	1.87
150	6.2	79	84	159	233	189	118	73	37	16	11	1	0	0	0	4.4	2.17
180	9.4	56	64	130	201	208	131	105	59	24	19	3	0	0	0	5.0	2.29
210	13.0	30	45	113	160	188	143	136	97	47	36	4	0	0	0	5.6	2.39
240	14.2	46	84	132	164	166	138	118	72	38	30	10	3	0	0	5.3	2.09
270	13.4	69	115	165	160	138	115	77	72	29	43	12	4	1	0	4.9	1.73
300	7.1	92	123	162	186	165	101	72	38	27	24	6	3	0	0	4.5	1.77
330	4.4	119	154	204	204	144	87	52	26	5	4	0	2	0	0	3.8	1.89
Total	100.0	83	122	170	179	157	108	81	51	23	20	4	1	0	0	4.5	1.86

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.2	4.2	3.3	2.7	2.5	2.4	2.2	2.8	3.5	4.3	4.7	3.4
3	4.6	4.3	4.3	3.3	2.7	2.6	2.6	2.2	2.8	3.5	4.3	4.6	3.5
6	4.7	4.0	4.3	3.3	3.1	3.0	2.8	2.3	3.0	3.5	4.4	4.8	3.6
9	4.7	4.0	4.8	4.5	4.2	3.7	3.7	3.5	3.9	4.0	4.6	4.7	4.2
12	5.1	4.7	5.6	5.2	4.7	4.5	4.2	4.0	4.5	4.7	5.1	5.1	4.8
15	5.0	4.7	5.7	5.4	4.9	4.5	4.3	4.0	4.3	4.3	5.0	5.0	4.7
18	4.8	4.0	4.4	4.2	4.3	4.0	3.6	3.1	2.9	3.3	4.6	4.8	4.0
21	4.9	4.1	4.1	3.1	2.8	2.7	2.4	2.1	2.8	3.3	4.6	4.6	3.4
Day	4.8	4.3	4.7	4.0	3.7	3.4	3.2	2.9	3.4	3.8	4.6	4.8	3.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.3	6.1	4.8	4.9	6.7	7.9	8.9	8.8	8.0	7.3	6.6	7.2
	2.32	2.48	2.34	1.83	1.90	2.46	2.68	2.81	2.66	2.25	2.08	2.17	2.16
25	6.4	6.9	6.7	5.3	5.4	7.3	8.6	9.7	9.6	8.8	8.0	7.3	7.9
	2.39	2.56	2.41	1.88	1.96	2.54	2.77	2.90	2.74	2.32	2.15	2.24	2.21
50	6.8	7.4	7.2	5.7	5.8	7.8	9.3	10.4	10.3	9.4	8.6	7.8	8.5
	2.45	2.63	2.47	1.93	2.02	2.61	2.84	2.98	2.82	2.38	2.20	2.30	2.26
100	7.4	8.0	7.8	6.1	6.3	8.5	10.1	11.3	11.2	10.2	9.3	8.5	9.2
	2.38	2.55	2.40	1.87	1.95	2.53	2.75	2.88	2.73	2.31	2.13	2.22	2.21
200	8.2	8.9	8.6	6.8	6.9	9.4	11.2	12.5	12.4	11.3	10.3	9.4	10.2
	2.25	2.41	2.27	1.77	1.85	2.39	2.60	2.73	2.58	2.19	2.02	2.10	2.10
Freq	4.7	6.3	7.1	7.3	6.4	6.0	8.2	11.7	13.7	13.7	9.6	5.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.5	4.1	3.1	3.7	4.9	5.7	6.3	6.0	5.4	5.0	4.5	5.0
	1.97	2.13	1.85	1.49	1.76	2.17	2.28	2.44	2.17	1.80	1.78	1.85	1.87
25	4.8	5.4	4.9	3.8	4.5	5.9	6.8	7.6	7.2	6.5	6.0	5.3	6.0
	2.12	2.30	2.00	1.60	1.90	2.34	2.47	2.64	2.34	1.95	1.92	2.00	2.00
50	5.5	6.3	5.7	4.4	5.2	6.8	7.8	8.7	8.3	7.5	7.0	6.2	7.0
	2.38	2.59	2.25	1.80	2.13	2.63	2.77	2.97	2.63	2.19	2.16	2.25	2.21
100	6.5	7.4	6.8	5.2	6.2	8.1	9.2	10.4	9.9	8.9	8.3	7.3	8.3
	2.54	2.76	2.40	1.92	2.27	2.81	2.95	3.16	2.81	2.33	2.30	2.40	2.33
200	8.1	9.3	8.4	6.5	7.7	10.0	11.5	12.9	12.3	11.1	10.3	9.1	10.3
	2.42	2.63	2.29	1.83	2.17	2.68	2.82	3.02	2.68	2.22	2.19	2.29	2.24
Freq	4.9	6.7	7.2	7.5	5.7	6.1	9.0	12.6	14.0	13.5	8.0	4.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	4.0	3.5	2.7	3.4	4.3	5.0	5.5	5.2	4.6	4.4	3.8	4.4
	1.97	2.16	1.81	1.52	1.85	2.19	2.31	2.42	2.13	1.76	1.79	1.90	1.87
25	4.2	4.9	4.4	3.4	4.2	5.4	6.1	6.8	6.4	5.7	5.4	4.7	5.4
	2.11	2.31	1.94	1.63	1.98	2.34	2.48	2.59	2.28	1.89	1.92	2.03	1.98
50	5.0	5.8	5.1	4.0	4.9	6.3	7.2	8.0	7.5	6.7	6.3	5.6	6.4
	2.34	2.56	2.14	1.80	2.19	2.59	2.74	2.87	2.53	2.09	2.12	2.25	2.16
100	5.9	6.9	6.1	4.8	5.8	7.5	8.5	9.5	9.0	8.0	7.6	6.6	7.6
	2.57	2.81	2.35	1.98	2.40	2.85	3.01	3.15	2.78	2.30	2.33	2.47	2.34
200	7.3	8.5	7.5	5.9	7.2	9.2	10.5	11.7	11.1	9.9	9.3	8.2	9.4
	2.46	2.69	2.25	1.90	2.30	2.73	2.88	3.02	2.66	2.20	2.23	2.37	2.26
Freq	5.0	6.9	7.2	7.6	5.5	6.2	9.2	12.9	14.2	13.5	7.4	4.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.1	2.7	2.1	2.8	3.5	4.0	4.4	4.1	3.6	3.4	3.0	3.5
	2.01	2.12	1.78	1.50	1.90	2.19	2.32	2.42	2.10	1.76	1.79	1.90	1.87
25	3.6	4.1	3.6	2.8	3.7	4.6	5.2	5.7	5.3	4.8	4.5	3.9	4.6
	2.13	2.25	1.89	1.59	2.02	2.32	2.46	2.56	2.23	1.87	1.90	2.01	1.97
50	4.4	5.0	4.3	3.4	4.4	5.6	6.3	6.9	6.4	5.8	5.4	4.7	5.5
	2.31	2.44	2.05	1.73	2.19	2.53	2.67	2.78	2.42	2.03	2.06	2.18	2.12
100	5.3	6.0	5.2	4.1	5.3	6.7	7.6	8.3	7.8	7.0	6.6	5.7	6.7
	2.63	2.78	2.34	1.96	2.50	2.88	3.05	3.17	2.76	2.31	2.35	2.49	2.37
200	6.4	7.3	6.4	5.1	6.5	8.2	9.2	10.1	9.5	8.5	8.0	6.9	8.1
	2.54	2.68	2.26	1.89	2.40	2.77	2.93	3.06	2.66	2.22	2.26	2.40	2.29
Freq	5.2	7.1	7.3	7.3	5.5	6.4	9.7	13.1	14.2	12.9	6.9	4.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	284	4.5	112	3.9	74	3.1	36
25	7.0	365	5.4	180	4.8	131	4.0	78
50	7.5	443	6.2	254	5.6	195	4.9	128
100	8.1	578	7.4	406	6.7	309	5.9	206
200	9.0	814	9.2	807	8.3	599	7.2	385

Melsbroek

50° 54′ 00″ N	04° 28′ 00″ E	UTM 31	E 603139 m	N 5639844 m	36 m a.s.l.

The station is located at the national airport in Brussels. The vast metropolitan area of the capital and its suburbs covers the entire SW quadrant up to distances of 15–20 km, as seen from the station location. On the large scale the station is situated on the border between the large flat plain of Flanders to the N, and an area of gently rolling terrain to the S.
The wind measurements are primarily influenced by the large hangars and main airport buildings located in the SE–SW through S sectors at distances between 500 and 800 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	700	0.25	2750	0.20								
30	0.01	1750	0.25	4750	0.20								
60	0.01	2250	0.20										
90	0.01	2000	0.20										
120	0.01	3500	0.20									-2	
150	0.01	2250	0.25									-16	
180	0.01	1500	0.30									-8	
210	0.01	1000	0.30	7000	0.50							-3	
240	0.01	1750	0.30	5500	0.50								
270	0.01	1750	0.30										
300	0.01	625	0.15	2500	0.30								
330	0.01	550	0.15	2250	0.25	5000	0.10						

Height of anemometer: 10.7 m a.g.l. Period: 70010103–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	4.7	145	186	259	183	111	62	31	14	6	2	1	0	0	0	3.2	1.72
30	8.7	95	145	202	198	123	105	70	32	17	11	1	0	0	0	4.0	1.81
60	8.5	81	158	212	198	123	87	65	37	23	13	3	0	0	0	4.0	1.70
90	5.0	144	206	245	168	95	64	35	26	12	5	1	0	0	0	3.2	1.53
120	3.4	145	204	293	203	106	29	14	3	3	0	0	0	0	0	3.0	2.04
150	5.7	85	131	237	243	142	83	51	15	5	6	1	0	0	0	3.8	2.04
180	10.5	54	92	193	194	142	113	82	59	27	33	10	1	0	0	4.7	1.77
210	16.0	29	45	91	119	132	140	130	102	74	93	34	8	2	0	6.6	2.22
240	18.6	28	35	79	114	143	150	142	114	71	85	29	8	2	1	6.6	2.31
270	7.8	59	84	152	170	147	116	97	66	38	45	19	5	1	0	5.2	1.77
300	5.4	93	160	203	183	142	88	55	35	19	18	3	1	0	0	4.0	1.69
330	5.8	128	165	210	173	132	92	53	28	8	10	1	0	0	0	3.7	1.75
Total	100.0	72	108	168	166	132	110	88	61	37	42	14	3	1	0	4.9	1.70

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.1	4.4	4.2	3.8	3.3	2.9	3.0	2.6	3.2	3.5	5.0	5.0	3.8
3	4.9	4.3	4.3	3.8	3.2	2.8	3.1	2.6	3.3	3.5	5.0	5.2	3.8
6	5.0	4.3	4.2	3.9	3.4	3.0	3.3	2.8	3.4	3.4	5.1	5.2	3.9
9	5.2	4.7	4.8	4.9	4.3	3.8	4.1	3.8	4.3	4.0	5.3	5.2	4.5
12	5.6	5.3	5.7	5.5	4.8	4.6	4.7	4.6	5.1	4.6	5.9	5.6	5.2
15	5.4	5.3	5.7	5.8	5.0	4.8	4.9	4.7	5.0	4.7	5.5	5.3	5.2
18	5.1	4.4	4.6	5.2	4.6	4.5	4.5	3.8	3.8	3.5	5.1	5.2	4.5
21	5.2	4.6	4.2	3.9	3.4	3.1	3.2	2.7	3.4	3.6	5.1	5.0	3.9
Day	5.2	4.7	4.7	4.6	4.0	3.7	3.8	3.4	3.9	3.8	5.3	5.2	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	5.5	5.6	5.1	4.4	5.8	7.2	9.4	9.7	8.7	6.7	5.8	7.3
	2.00	2.09	2.04	1.89	2.02	2.19	2.06	2.33	2.58	2.40	2.01	2.05	1.91
25	5.6	6.1	6.2	5.6	4.8	6.3	7.9	10.3	10.6	9.5	7.3	6.3	8.0
	2.06	2.16	2.10	1.95	2.08	2.26	2.13	2.38	2.64	2.47	2.07	2.11	1.96
50	6.0	6.5	6.6	6.0	5.1	6.8	8.5	11.0	11.4	10.2	7.9	6.8	8.6
	2.12	2.22	2.15	2.00	2.14	2.32	2.19	2.44	2.71	2.53	2.12	2.16	2.00
100	6.5	7.1	7.2	6.5	5.6	7.4	9.2	11.8	12.3	11.1	8.6	7.3	9.3
	2.05	2.15	2.09	1.94	2.07	2.24	2.12	2.39	2.65	2.46	2.06	2.10	1.96
200	7.2	7.8	7.9	7.1	6.1	8.2	10.1	12.9	13.4	12.2	9.4	8.1	10.2
	1.94	2.03	1.98	1.84	1.96	2.13	2.01	2.30	2.54	2.34	1.95	1.98	1.90
Freq	5.1	7.2	8.6	6.3	4.0	4.8	8.7	14.1	17.7	11.7	6.2	5.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	4.0	3.9	3.3	3.0	4.3	5.2	7.0	6.8	5.6	4.4	3.9	5.1
	1.67	1.79	1.71	1.53	1.88	1.94	1.78	2.14	2.26	1.85	1.65	1.72	1.69
25	4.1	4.7	4.7	4.0	3.6	5.2	6.2	8.3	8.1	6.7	5.3	4.7	6.1
	1.81	1.94	1.84	1.65	2.03	2.10	1.92	2.25	2.39	2.00	1.78	1.86	1.79
50	4.8	5.5	5.5	4.6	4.2	6.0	7.2	9.4	9.2	7.8	6.1	5.5	7.1
	2.03	2.18	2.07	1.85	2.28	2.36	2.16	2.43	2.61	2.24	2.00	2.09	1.94
100	5.7	6.5	6.5	5.5	4.9	7.2	8.6	10.8	10.7	9.2	7.3	6.5	8.3
	2.16	2.32	2.20	1.98	2.43	2.51	2.30	2.61	2.80	2.39	2.13	2.22	2.06
200	7.1	8.1	8.1	6.8	6.1	8.9	10.6	12.8	12.9	11.4	9.0	8.1	10.2
	2.06	2.21	2.10	1.88	2.32	2.40	2.19	2.51	2.69	2.28	2.04	2.12	2.03
Freq	4.8	8.2	8.5	5.4	3.6	5.3	9.9	15.4	18.3	9.1	5.7	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.5	3.4	2.9	2.6	3.9	4.5	6.2	5.9	4.7	3.8	3.4	4.5
	1.73	1.80	1.69	1.58	1.98	1.98	1.75	2.18	2.29	1.79	1.68	1.72	1.70
25	3.7	4.3	4.2	3.6	3.2	4.8	5.6	7.5	7.2	5.8	4.7	4.2	5.5
	1.84	1.93	1.81	1.69	2.12	2.12	1.87	2.28	2.41	1.92	1.79	1.83	1.78
50	4.4	5.1	5.0	4.2	3.8	5.6	6.6	8.7	8.4	6.8	5.5	4.9	6.5
	2.04	2.13	2.00	1.87	2.35	2.35	2.07	2.43	2.61	2.13	1.99	2.03	1.92
100	5.2	6.0	5.9	5.0	4.5	6.7	7.8	10.1	9.8	8.1	6.5	5.9	7.7
	2.24	2.34	2.20	2.05	2.58	2.58	2.27	2.66	2.87	2.34	2.18	2.23	2.08
200	6.4	7.4	7.3	6.2	5.6	8.2	9.6	11.9	11.9	10.0	8.1	7.3	9.3
	2.15	2.24	2.11	1.96	2.47	2.47	2.17	2.58	2.76	2.24	2.09	2.13	2.05
Freq	4.7	8.6	8.5	5.1	3.5	5.5	10.3	15.8	18.6	8.2	5.4	5.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.8	2.7	2.2	2.1	3.1	3.7	4.8	4.6	3.6	2.9	2.7	3.5
	1.73	1.84	1.73	1.51	1.79	1.91	1.81	2.20	2.26	1.76	1.69	1.75	1.71
25	3.2	3.7	3.6	2.9	2.8	4.1	4.9	6.3	6.0	4.7	3.8	3.5	4.6
	1.83	1.95	1.83	1.60	1.90	2.03	1.91	2.29	2.37	1.87	1.79	1.86	1.78
50	3.8	4.4	4.3	3.5	3.4	5.0	5.9	7.5	7.2	5.7	4.7	4.3	5.6
	1.99	2.12	1.99	1.74	2.06	2.20	2.08	2.42	2.53	2.03	1.95	2.02	1.89
100	4.7	5.3	5.2	4.3	4.1	6.0	7.2	8.9	8.6	6.9	5.6	5.1	6.7
	2.26	2.41	2.27	1.98	2.35	2.51	2.37	2.65	2.83	2.31	2.22	2.30	2.08
200	5.7	6.5	6.4	5.2	5.0	7.3	8.8	10.6	10.3	8.4	6.9	6.3	8.1
	2.18	2.32	2.19	1.91	2.27	2.42	2.28	2.63	2.77	2.22	2.13	2.21	2.06
Freq	5.1	8.7	8.1	4.8	3.5	6.1	10.9	16.3	17.6	7.6	5.4	5.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.5	339	4.6	135	4.0	89	3.2	43
25	7.1	433	5.5	214	4.9	157	4.1	93
50	7.6	522	6.3	297	5.7	231	5.0	152
100	8.3	670	7.4	453	6.8	350	6.0	237
200	9.1	917	9.0	842	8.2	640	7.2	424

Middelkerke

51° 12′ 00″ N	02° 52′ 00″ E	UTM 31	E 490683 m	N 5672191 m	4 m a.s.l.

The station is located on an airfield about 1250 m from the North Sea coastline. The surrounding area is extremely flat and open farmland. The nearest large rough area is the city of Oostende to the NE, with the edge of the built-up area at about 2.5 km from the station.
The anemometer is located on the E side of a 700 m long narrow lake, extending to the WSW. Around the lake is a camping area and many caravans shelter the anemometer in the sectors W–N. The main airport buildings are situated more than 900 m to the NNE and are not considered to be obstacles.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	800	0.20	1600	0.00							-1	
30	0.01	1600	0.40	3250	0.00							-5	
60	0.03	2500	0.40										
90	0.01	2250	0.15										
120	0.01	2500	0.10	5000	0.15								
150	0.01	1750	0.10									-3	
180	0.01	2000	0.10									-3	
210	0.01	750	0.10										
240	0.01	2750	0.10										
270	0.001	500	0.10	2375	0.00								
300	0.01	750	0.10	1500	0.00								
330	0.01	650	0.10	1300	0.00								

Height of anemometer: 12.7 m a.g.l. Period: 72010103–81123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.8	29	46	90	141	135	138	127	109	69	81	28	8	2	2	6.5	2.15
30	9.6	23	27	52	96	110	135	150	135	104	110	45	12	1	0	7.3	2.66
60	7.6	33	52	112	144	154	145	128	101	60	51	17	2	0	0	5.9	2.28
90	7.0	48	80	190	225	164	120	71	47	29	20	4	1	0	0	4.6	1.89
120	4.1	53	126	218	223	156	95	66	36	11	13	4	0	0	0	4.2	1.87
150	6.1	48	95	148	195	160	119	94	74	35	24	6	2	0	0	4.9	1.96
180	11.7	30	58	129	144	148	113	115	87	66	74	28	7	2	0	6.0	1.97
210	13.4	24	61	123	205	155	112	94	78	46	65	26	8	1	2	5.6	1.71
240	10.6	19	32	53	71	81	94	112	111	97	158	99	42	17	11	8.6	2.30
270	9.6	29	33	53	83	102	108	131	134	88	117	68	33	13	9	7.9	2.16
300	7.4	33	43	67	117	129	98	96	96	82	109	62	43	16	8	7.5	1.91
330	6.1	42	44	94	126	116	103	99	83	91	116	51	23	5	6	7.0	1.94
Total	100.0	32	54	104	143	132	115	110	95	68	84	40	16	5	3	6.5	1.89

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.2	5.3	5.4	5.5	4.9	4.2	4.3	3.9	4.7	4.9	6.4	6.5	5.2
3	6.2	5.3	5.4	5.5	4.7	4.3	4.3	3.9	4.7	4.9	6.3	6.5	5.2
6	6.2	5.3	5.4	5.6	4.8	4.3	4.4	3.9	4.7	5.1	6.3	6.6	5.2
9	6.1	5.4	6.2	6.3	5.8	5.3	5.3	4.8	5.5	5.5	6.4	6.6	5.8
12	6.9	6.2	7.1	7.2	6.5	6.1	6.2	5.8	6.4	6.3	7.4	7.1	6.6
15	6.7	6.3	7.1	7.4	6.7	6.4	6.5	6.1	6.4	6.0	7.1	6.9	6.6
18	6.3	5.3	6.1	6.7	6.1	5.9	6.0	5.4	5.2	5.0	6.7	6.5	5.9
21	6.3	5.4	5.7	5.7	5.1	4.6	4.6	4.2	4.8	4.9	6.6	6.4	5.4
Day	6.4	5.6	6.0	6.2	5.6	5.1	5.2	4.7	5.3	5.3	6.7	6.6	5.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	8.7	9.0	6.7	5.7	6.6	8.2	7.9	10.4	9.3	8.5	8.0	8.3
	2.06	2.53	2.78	2.19	2.18	2.24	2.30	2.05	2.32	2.10	1.95	1.90	2.08
25	8.1	9.5	9.8	7.3	6.2	7.3	8.9	8.7	11.3	10.1	9.3	8.7	9.0
	2.13	2.61	2.87	2.26	2.25	2.31	2.37	2.11	2.36	2.14	1.99	1.96	2.13
50	8.8	10.2	10.5	7.9	6.7	7.8	9.6	9.3	12.1	10.8	10.0	9.4	9.7
	2.19	2.67	2.94	2.32	2.31	2.37	2.43	2.17	2.42	2.20	2.05	2.01	2.18
100	9.5	11.1	11.4	8.5	7.3	8.5	10.4	10.1	12.9	11.6	10.8	10.1	10.5
	2.12	2.59	2.85	2.24	2.24	2.29	2.35	2.11	2.38	2.15	2.00	1.96	2.14
200	10.5	12.3	12.7	9.4	8.0	9.4	11.5	11.1	14.0	12.6	11.7	11.1	11.5
	2.01	2.45	2.70	2.12	2.12	2.17	2.22	2.01	2.31	2.07	1.92	1.86	2.06
Freq	6.7	9.1	7.9	7.1	4.7	5.7	10.6	13.0	11.3	9.8	7.8	6.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	6.2	6.1	4.3	4.0	4.8	5.8	5.5	7.9	6.3	5.9	5.4	5.8
	1.79	2.18	2.20	1.86	1.85	1.90	1.92	1.69	2.26	1.84	1.64	1.63	1.79
25	6.2	7.4	7.3	5.2	4.8	5.8	6.9	6.6	9.3	7.4	7.0	6.5	6.9
	1.93	2.35	2.37	2.01	1.99	2.05	2.06	1.80	2.34	1.95	1.73	1.74	1.90
50	7.2	8.6	8.4	6.0	5.5	6.7	8.0	7.6	10.5	8.5	8.0	7.5	7.9
	2.17	2.64	2.67	2.26	2.24	2.31	2.31	1.99	2.48	2.12	1.88	1.94	2.09
100	8.5	10.1	9.9	7.1	6.5	7.9	9.4	8.9	11.9	9.9	9.3	8.9	9.3
	2.31	2.81	2.84	2.40	2.38	2.45	2.46	2.13	2.66	2.28	2.02	2.07	2.24
200	10.6	12.6	12.4	8.8	8.1	9.9	11.6	10.8	13.8	11.9	11.2	11.0	11.4
	2.20	2.69	2.71	2.30	2.28	2.35	2.35	2.04	2.58	2.19	1.94	1.98	2.19
Freq	6.9	9.4	7.6	6.9	4.2	6.3	11.8	13.3	10.6	9.5	7.3	6.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	5.4	5.2	3.8	3.5	4.3	5.0	5.0	6.8	5.4	5.1	4.7	5.0
	1.84	2.17	2.14	1.91	1.84	1.88	1.92	1.74	2.22	1.83	1.64	1.63	1.81
25	5.7	6.6	6.4	4.7	4.4	5.3	6.2	6.1	8.3	6.7	6.3	5.8	6.2
	1.97	2.32	2.30	2.05	1.97	2.01	2.05	1.84	2.30	1.93	1.72	1.74	1.90
50	6.7	7.8	7.4	5.5	5.1	6.3	7.3	7.2	9.5	7.8	7.3	6.8	7.3
	2.18	2.56	2.54	2.26	2.18	2.22	2.26	1.99	2.42	2.08	1.85	1.91	2.06
100	8.0	9.2	8.9	6.5	6.1	7.5	8.6	8.4	10.9	9.1	8.5	8.1	8.6
	2.40	2.82	2.79	2.49	2.39	2.45	2.48	2.19	2.63	2.28	2.03	2.10	2.27
200	9.9	11.4	10.9	8.0	7.6	9.2	10.6	10.2	12.7	10.9	10.2	10.0	10.4
	2.30	2.70	2.67	2.38	2.29	2.34	2.37	2.11	2.56	2.20	1.96	2.01	2.22
Freq	7.1	9.3	7.6	6.6	4.3	6.8	11.9	13.0	10.6	9.3	7.2	6.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.2	3.9	3.0	2.9	3.5	3.9	4.1	5.3	4.3	4.0	3.7	4.0
	1.88	2.12	2.06	1.94	1.88	1.88	1.90	1.79	2.21	1.82	1.64	1.64	1.81
25	4.9	5.5	5.2	3.9	3.8	4.6	5.2	5.4	6.8	5.6	5.2	4.8	5.2
	1.99	2.24	2.18	2.05	1.99	1.99	2.01	1.87	2.28	1.90	1.72	1.74	1.90
50	6.0	6.7	6.2	4.7	4.6	5.6	6.2	6.5	8.1	6.7	6.3	5.9	6.3
	2.16	2.44	2.37	2.23	2.16	2.17	2.18	1.99	2.38	2.02	1.83	1.88	2.03
100	7.2	8.0	7.5	5.7	5.6	6.8	7.5	7.7	9.5	8.0	7.5	7.1	7.5
	2.46	2.78	2.70	2.54	2.46	2.47	2.48	2.20	2.56	2.24	2.03	2.14	2.27
200	8.8	9.8	9.1	7.0	6.8	8.2	9.1	9.2	11.1	9.5	9.0	8.6	9.1
	2.37	2.67	2.60	2.45	2.37	2.38	2.39	2.17	2.58	2.20	1.99	2.06	2.24
Freq	7.4	9.1	7.6	6.2	4.6	7.5	12.1	12.6	10.5	9.0	7.1	6.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.3	443	5.1	178	4.5	117	3.5	57
25	8.0	566	6.1	281	5.5	206	4.6	122
50	8.6	683	7.0	388	6.4	300	5.6	198
100	9.3	875	8.2	588	7.6	453	6.7	308
200	10.2	1199	10.1	1093	9.2	828	8.0	548

Saint Hubert

50° 02′ 00″ N 05° 24′ 00″ E	UTM 31 E 671881 m N 5545208 m	556 m a.s.l.

Location in the SE part of the country, on one of the highest hills of the Ardennes. The terrain is rolling and is characterized by large woods of pine-trees, scattered villages, heath and some farmland. The synoptic station is situated on a small grass airfield. The village of St. Hubert is situated in a valley approx. 2.5 km from the anemometer to the SW. The terrain close to the station slopes down significantly in the sectors between S and W.
The local topography influences the winds from SW, the prevailing sector. Close to the anemometer, between 160° and 240°, some scattered pine-trees at a distance of about 100 m are the only nearby sheltering obstacles.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	800	0.30									13	4
30	0.01	600	0.30									19	1
60	0.01	500	0.30									16	-4
90	0.01	550	0.30									7	-4
120	0.05	500	0.30									2	-1
150	0.05	500	0.30									6	4
180	0.05	400	0.25									15	4
210	0.05	400	0.30									21	1
240	0.05	300	0.25	4250	0.30							17	-4
270	0.05	325	0.25	3620	0.20	7500	0.30					8	-5
300	0.05	425	0.10	1200	0.30							2	-1
330	0.01	1000	0.30									5	4

Height of anemometer: 10.9 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.0	56	96	174	212	184	134	75	43	16	10	1	0	0	0	4.5	2.20
30	8.9	34	71	181	236	216	135	67	34	19	8	0	0	0	0	4.5	2.38
60	8.0	26	58	158	239	235	143	87	34	15	4	1	0	0	0	4.7	2.61
90	6.7	31	48	94	198	203	155	111	80	44	33	2	0	0	0	5.4	2.33
120	7.3	27	53	141	219	204	159	109	49	24	11	4	0	0	0	5.0	2.43
150	6.3	32	76	175	229	191	152	88	41	11	5	0	0	0	0	4.6	2.44
180	9.8	37	98	160	204	168	145	92	50	24	18	2	0	0	0	4.8	2.17
210	13.0	34	70	104	146	142	141	126	93	60	59	20	4	1	0	6.0	2.18
240	14.5	35	94	153	182	169	133	103	66	33	24	8	0	0	0	5.0	2.09
270	8.1	67	100	169	179	151	111	83	56	46	32	5	0	0	0	4.8	1.87
300	6.6	65	106	183	210	159	113	86	47	17	14	1	0	0	0	4.4	1.99
330	4.8	76	103	192	227	170	103	66	33	15	11	3	0	0	0	4.3	1.98
Total	100.0	41	81	153	201	180	136	94	56	30	22	5	1	0	0	4.9	2.11

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.0	4.8	4.4	4.2	3.9	3.4	3.4	3.4	3.6	4.3	4.5	5.0	4.2
3	5.0	4.7	4.4	4.2	3.9	3.5	3.5	3.4	3.5	4.1	4.5	5.1	4.2
6	4.9	4.8	4.4	4.1	4.0	3.5	3.4	3.5	3.6	4.2	4.6	4.9	4.2
9	4.8	4.7	4.7	4.7	4.6	4.2	4.1	4.1	4.2	4.4	4.6	5.0	4.5
12	5.1	4.9	5.0	5.1	4.9	4.6	4.4	4.4	4.6	4.7	4.9	5.1	4.8
15	4.9	4.7	5.0	5.1	4.7	4.6	4.4	4.3	4.4	4.3	4.7	4.9	4.7
18	5.0	4.3	4.1	4.3	4.0	4.1	3.9	3.4	3.3	4.1	4.7	5.0	4.2
21	5.0	4.7	4.3	4.0	3.7	3.3	3.2	3.4	3.6	4.3	4.7	5.1	4.1
Day	5.0	4.7	4.5	4.5	4.2	3.9	3.8	3.8	3.9	4.3	4.7	5.0	4.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	5.9	6.1	7.0	8.0	7.7	7.2	8.0	7.8	7.5	7.4	6.6	7.2
	2.51	2.73	2.91	2.64	2.78	2.82	2.60	2.48	2.48	2.32	2.26	2.29	2.42
25	6.6	6.4	6.6	7.7	8.8	8.5	7.9	8.7	8.6	8.3	8.1	7.2	7.9
	2.59	2.82	3.00	2.72	2.87	2.91	2.69	2.56	2.56	2.40	2.33	2.36	2.50
50	7.1	6.9	7.1	8.2	9.4	9.1	8.5	9.3	9.2	8.9	8.7	7.8	8.5
	2.66	2.89	3.08	2.80	2.94	2.98	2.76	2.63	2.63	2.46	2.40	2.42	2.56
100	7.7	7.5	7.7	8.9	10.2	9.9	9.2	10.1	10.0	9.6	9.4	8.4	9.2
	2.57	2.80	2.98	2.70	2.85	2.89	2.67	2.55	2.55	2.38	2.32	2.35	2.48
200	8.5	8.3	8.5	9.9	11.3	10.9	10.2	11.2	11.0	10.6	10.4	9.3	10.2
	2.44	2.65	2.82	2.56	2.70	2.74	2.53	2.41	2.41	2.26	2.20	2.22	2.36
Freq	5.7	7.0	7.6	7.3	7.7	7.7	8.6	10.6	12.2	11.0	8.3	6.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.1	4.4	5.2	5.7	5.3	5.0	5.7	5.3	5.3	5.1	4.4	5.1
	2.16	2.31	2.46	2.26	2.35	2.37	2.13	2.12	2.05	1.92	1.96	1.93	2.06
25	5.0	4.9	5.2	6.2	6.8	6.3	6.0	6.9	6.4	6.4	6.1	5.3	6.1
	2.33	2.50	2.66	2.45	2.54	2.56	2.30	2.28	2.21	2.08	2.12	2.08	2.22
50	5.8	5.7	6.0	7.2	7.8	7.3	6.9	7.9	7.3	7.4	7.1	6.1	7.0
	2.62	2.81	2.99	2.75	2.85	2.88	2.59	2.57	2.49	2.34	2.38	2.35	2.48
100	6.9	6.7	7.1	8.5	9.3	8.6	8.2	9.4	8.7	8.7	8.4	7.2	8.3
	2.79	2.99	3.18	2.93	3.04	3.06	2.76	2.74	2.65	2.49	2.54	2.50	2.63
200	8.6	8.4	8.8	10.5	11.6	10.7	10.2	11.7	10.8	10.9	10.5	9.0	10.3
	2.67	2.86	3.04	2.80	2.90	2.93	2.63	2.61	2.53	2.38	2.42	2.38	2.52
Freq	5.8	7.5	7.4	7.2	8.0	7.5	9.1	11.0	12.7	10.0	7.9	5.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.6	3.8	4.6	5.0	4.5	4.4	5.1	4.6	4.7	4.4	3.8	4.4
	2.20	2.34	2.52	2.30	2.38	2.33	2.12	2.13	2.06	1.90	1.94	1.99	2.06
25	4.5	4.4	4.7	5.7	6.2	5.6	5.4	6.3	5.7	5.8	5.4	4.7	5.5
	2.35	2.50	2.70	2.46	2.55	2.49	2.28	2.28	2.20	2.04	2.08	2.13	2.21
50	5.3	5.2	5.5	6.6	7.2	6.5	6.3	7.3	6.6	6.7	6.4	5.5	6.4
	2.60	2.77	2.99	2.72	2.82	2.76	2.52	2.53	2.44	2.26	2.30	2.36	2.43
100	6.3	6.2	6.5	7.9	8.5	7.8	7.5	8.7	7.9	8.0	7.6	6.6	7.6
	2.86	3.05	3.29	2.99	3.10	3.03	2.77	2.78	2.68	2.48	2.53	2.59	2.65
200	7.8	7.6	8.1	9.8	10.6	9.6	9.3	10.8	9.8	9.9	9.4	8.1	9.4
	2.74	2.92	3.15	2.86	2.97	2.90	2.65	2.66	2.56	2.37	2.42	2.48	2.54
Freq	5.9	7.7	7.4	7.2	8.1	7.4	9.3	11.1	12.9	9.7	7.7	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.8	3.1	3.7	4.0	3.5	3.5	4.0	3.6	3.7	3.5	3.0	3.5
	2.24	2.37	2.45	2.35	2.39	2.32	2.08	2.14	2.07	1.91	1.95	2.03	2.08
25	3.8	3.8	4.0	4.9	5.2	4.6	4.5	5.3	4.7	4.8	4.6	3.9	4.6
	2.38	2.51	2.60	2.50	2.53	2.46	2.21	2.27	2.19	2.03	2.07	2.15	2.19
50	4.6	4.5	4.8	5.9	6.3	5.6	5.5	6.3	5.7	5.8	5.5	4.7	5.5
	2.58	2.72	2.83	2.71	2.75	2.68	2.40	2.46	2.38	2.20	2.24	2.33	2.37
100	5.5	5.4	5.8	7.1	7.5	6.7	6.6	7.6	6.9	7.1	6.6	5.6	6.7
	2.94	3.10	3.22	3.09	3.13	3.05	2.74	2.81	2.71	2.51	2.56	2.66	2.68
200	6.8	6.6	7.1	8.6	9.2	8.2	8.1	9.3	8.4	8.6	8.1	6.9	8.1
	2.83	2.99	3.11	2.98	3.02	2.94	2.63	2.70	2.62	2.42	2.47	2.56	2.59
Freq	6.1	7.7	7.3	7.1	8.2	7.5	9.6	11.3	12.9	9.3	7.6	5.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	260	4.5	102	3.9	67	3.1	33
25	7.0	333	5.4	164	4.8	120	4.1	72
50	7.5	406	6.2	233	5.7	179	4.9	118
100	8.2	530	7.4	374	6.8	285	5.9	191
200	9.0	744	9.2	741	8.3	551	7.2	356

Spa

50° 29′ 00″ N	05° 55′ 00″ E	UTM 31	E 706918 m	N 5596550 m	573 m a.s.l.

Location in the E part of Belgium on the NW side of a long ridge of the Ardennes. The ridge runs SW-NE. The city of Spa is situated 3 km down-valley in the direction WNW. The highest areas of Belgium, reaching heights of almost 700 m, are found some tens of kilometres to the E. The station is situated at a local airfield and is completely surrounded by mostly fir woods with trees up to 35 m high. Within the airfield the surface is covered by low grass. There are no sheltering obstacles near the anemometer.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	450	0.30									-2	
30	0.01	200	0.30										2
60	0.01	150	0.30									4	2
90	0.01	150	0.30									6	
120	0.01	200	0.30									3	-2
150	0.01	300	0.30	800	0.15								-2
180	0.01	200	0.30	1200	0.15							-2	
210	0.01	350	0.30	1500	0.15							1	2
240	0.01	650	0.30									4	1
270	0.01	750	0.30									5	
300	0.01	900	0.30	2000	0.20							3	-1
330	0.01	400	0.30	1400	0.20								-2

Height of anemometer: 10.9 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.8	97	143	257	230	162	68	28	11	2	2	0	0	0	0	3.6	2.18
30	4.2	139	189	212	208	137	68	31	13	1	1	0	0	0	0	3.4	1.98
60	2.5	218	280	221	141	94	35	8	3	0	0	0	0	0	0	2.6	1.67
90	3.6	215	298	206	146	97	28	10	0	0	0	0	0	0	0	2.5	1.66
120	11.8	63	111	156	180	144	120	78	54	39	47	7	1	0	0	4.8	1.81
150	18.7	27	54	108	171	199	151	121	83	43	39	4	0	0	0	5.5	2.31
180	9.8	49	65	154	207	189	136	101	55	25	15	2	0	0	0	4.9	2.26
210	8.5	53	69	128	178	168	145	107	80	35	32	5	0	0	0	5.2	2.21
240	10.8	42	54	117	145	177	157	139	83	43	32	6	2	0	0	5.6	2.40
270	10.4	57	71	125	174	183	132	101	72	41	31	10	2	0	0	5.2	2.07
300	8.5	76	128	207	194	150	110	67	38	17	12	2	0	0	0	4.2	1.90
330	5.5	98	173	251	231	144	54	28	12	4	3	1	0	0	1	3.6	1.64
Total	100.0	69	103	158	182	167	120	87	56	29	25	4	1	0	0	4.7	1.97

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.1	4.7	4.3	3.4	3.5	2.9	3.1	3.3	3.9	4.6	4.8	5.5	4.1
3	5.0	4.7	4.2	3.6	4.0	3.2	3.4	3.4	3.8	4.6	4.8	5.4	4.2
6	5.0	4.7	4.0	3.6	3.8	3.2	3.3	3.4	3.8	4.6	4.8	5.2	4.1
9	5.1	4.5	4.3	4.1	4.0	3.7	3.7	3.7	4.1	4.6	4.9	5.4	4.3
12	5.2	4.6	4.5	4.5	4.2	4.1	4.2	4.1	4.3	4.5	5.1	5.3	4.5
15	4.8	4.2	4.4	4.6	4.0	4.2	4.2	3.9	4.1	3.9	4.7	5.0	4.3
18	4.9	4.1	3.4	3.5	3.4	3.5	3.4	2.9	2.9	3.8	4.8	5.2	3.8
21	5.1	4.5	3.8	3.2	2.9	2.6	2.7	2.8	3.5	4.5	4.9	5.3	3.8
Day	5.0	4.5	4.1	3.8	3.7	3.4	3.5	3.4	3.8	4.4	4.8	5.3	4.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	5.8	5.3	4.6	7.9	8.7	8.6	8.4	8.2	7.8	6.7	5.8	7.5
	2.28	2.38	2.10	1.97	1.96	2.54	2.68	2.63	2.74	2.58	2.31	2.02	2.25
25	6.3	6.4	5.9	5.1	8.6	9.5	9.4	9.1	9.0	8.5	7.3	6.4	8.3
	2.35	2.45	2.17	2.03	2.00	2.62	2.76	2.72	2.83	2.66	2.38	2.08	2.31
50	6.7	6.8	6.3	5.4	9.2	10.2	10.1	9.8	9.6	9.1	7.8	6.9	8.9
	2.41	2.51	2.22	2.09	2.06	2.69	2.84	2.79	2.90	2.73	2.45	2.13	2.36
100	7.3	7.4	6.8	5.9	9.9	11.1	11.0	10.6	10.4	9.9	8.5	7.4	9.6
	2.34	2.44	2.15	2.02	2.01	2.61	2.75	2.70	2.81	2.65	2.37	2.07	2.30
200	8.1	8.2	7.5	6.5	10.9	12.2	12.1	11.8	11.6	11.0	9.4	8.2	10.6
	2.21	2.31	2.04	1.92	1.92	2.47	2.60	2.56	2.66	2.51	2.24	1.96	2.19
Freq	6.0	5.0	3.2	2.9	8.1	16.0	13.8	9.5	9.8	10.1	8.9	6.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.2	3.5	3.2	5.7	6.1	6.0	5.8	5.7	5.3	4.4	4.0	5.3
	2.04	1.96	1.69	1.65	1.73	2.26	2.24	2.19	2.31	2.08	1.89	1.65	1.92
25	4.8	5.0	4.2	3.8	6.8	7.3	7.2	6.9	6.8	6.3	5.2	4.8	6.3
	2.20	2.11	1.82	1.78	1.84	2.44	2.42	2.37	2.50	2.24	2.05	1.79	2.06
50	5.6	5.8	4.8	4.5	7.8	8.4	8.3	8.0	7.9	7.3	6.0	5.6	7.3
	2.47	2.37	2.04	2.00	2.02	2.75	2.72	2.66	2.81	2.53	2.30	2.01	2.28
100	6.6	6.8	5.8	5.3	9.1	10.0	9.8	9.4	9.4	8.7	7.2	6.7	8.6
	2.63	2.53	2.17	2.13	2.16	2.92	2.90	2.84	2.99	2.69	2.45	2.13	2.41
200	8.2	8.5	7.2	6.6	11.1	12.4	12.2	11.8	11.6	10.8	8.9	8.3	10.7
	2.52	2.41	2.08	2.03	2.08	2.79	2.77	2.71	2.86	2.57	2.34	2.04	2.32
Freq	6.0	4.5	2.7	3.2	10.0	18.0	11.7	9.1	10.2	10.0	8.5	6.1	100.0

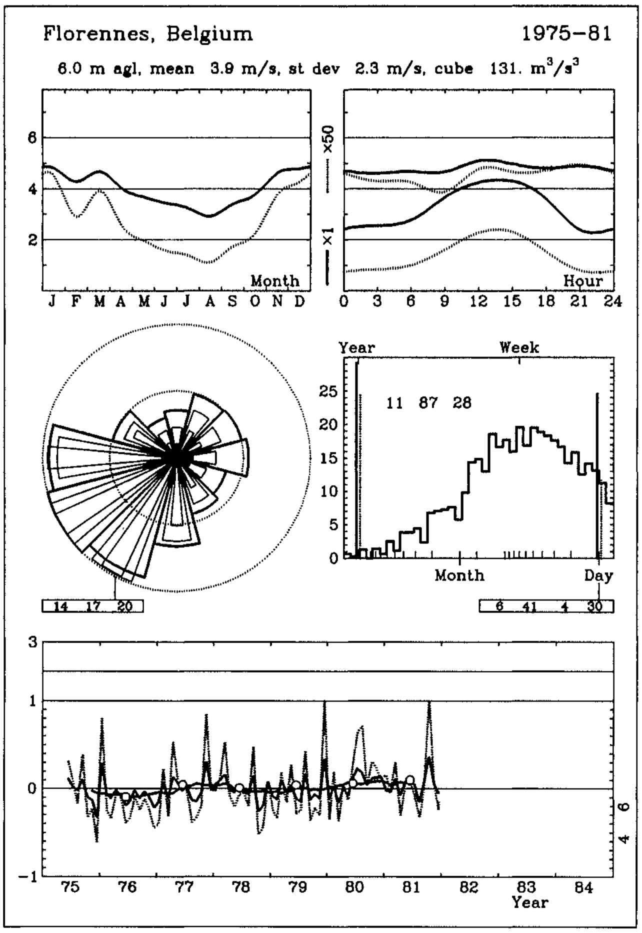
Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.7	3.0	2.8	5.1	5.3	5.2	5.0	5.0	4.6	3.7	3.5	4.6
	2.09	1.92	1.65	1.65	1.77	2.27	2.22	2.19	2.37	2.06	1.91	1.63	1.93
25	4.3	4.5	3.7	3.5	6.2	6.6	6.4	6.2	6.2	5.7	4.6	4.3	5.7
	2.24	2.06	1.77	1.76	1.87	2.43	2.38	2.35	2.54	2.20	2.04	1.75	2.04
50	5.1	5.3	4.3	4.1	7.3	7.7	7.6	7.3	7.2	6.6	5.4	5.1	6.6
	2.47	2.28	1.96	1.95	2.02	2.69	2.63	2.60	2.81	2.44	2.26	1.93	2.23
100	6.0	6.3	5.1	4.9	8.5	9.1	9.0	8.6	8.6	7.9	6.4	6.1	7.9
	2.72	2.51	2.15	2.14	2.22	2.96	2.90	2.86	3.09	2.68	2.48	2.12	2.42
200	7.4	7.8	6.3	6.0	10.3	11.3	11.1	10.7	10.6	9.8	8.0	7.5	9.7
	2.60	2.40	2.06	2.05	2.14	2.83	2.77	2.74	2.95	2.56	2.38	2.03	2.34
Freq	6.1	4.3	2.5	3.3	10.7	18.6	10.9	9.0	10.4	9.9	8.4	5.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.9	2.2	2.5	4.1	4.2	4.1	3.9	3.9	3.6	2.9	2.8	3.6
	2.13	1.92	1.61	1.50	1.85	2.31	2.24	2.23	2.37	2.05	1.90	1.67	1.95
25	3.7	3.8	3.0	3.3	5.3	5.5	5.4	5.2	5.2	4.7	3.8	3.6	4.8
	2.26	2.03	1.71	1.59	1.94	2.45	2.37	2.36	2.51	2.17	2.02	1.77	2.05
50	4.4	4.6	3.6	4.0	6.4	6.7	6.5	6.2	6.2	5.7	4.6	4.4	5.7
	2.46	2.21	1.85	1.73	2.08	2.66	2.58	2.57	2.72	2.36	2.19	1.92	2.20
100	5.3	5.5	4.3	4.8	7.6	8.0	7.8	7.5	7.5	6.8	5.6	5.3	6.9
	2.81	2.52	2.11	1.96	2.33	3.03	2.94	2.92	3.10	2.69	2.50	2.19	2.46
200	6.5	6.7	5.3	5.8	9.2	9.8	9.6	9.2	9.1	8.4	6.8	6.5	8.4
	2.70	2.43	2.03	1.89	2.28	2.92	2.83	2.82	2.99	2.59	2.40	2.11	2.39
Freq	5.9	4.1	2.5	3.8	11.8	18.4	10.5	8.9	10.4	9.8	8.1	5.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.7	312	4.7	123	4.1	82	3.2	39
25	7.3	401	5.6	196	5.0	144	4.2	86
50	7.9	488	6.4	278	5.9	214	5.1	141
100	8.5	634	7.6	442	7.0	339	6.1	226
200	9.4	890	9.5	869	8.6	648	7.5	419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Week
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Month
Day
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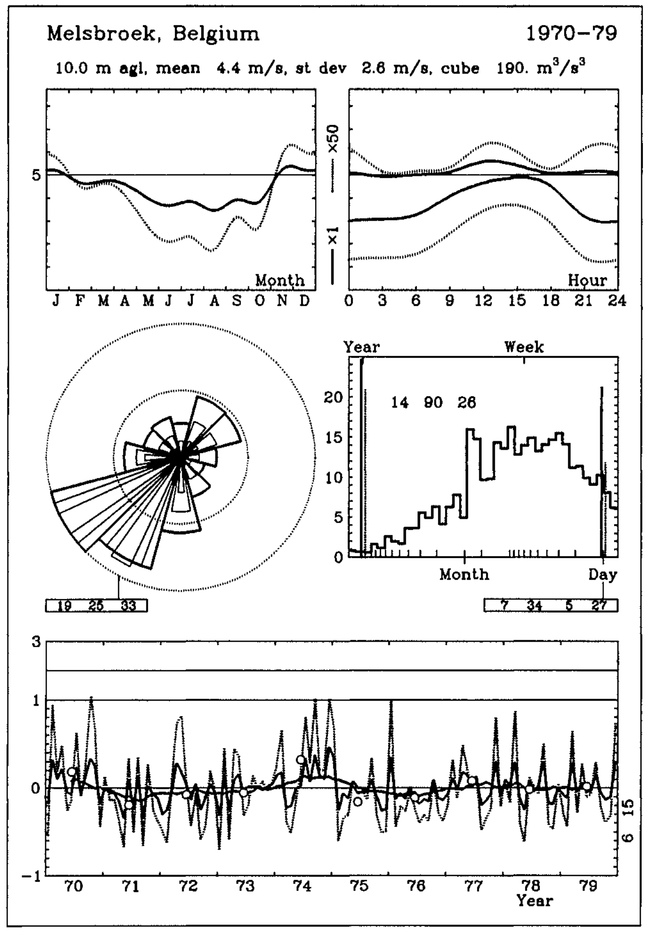
Year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1970–79
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Hour
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Week
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Month
Day
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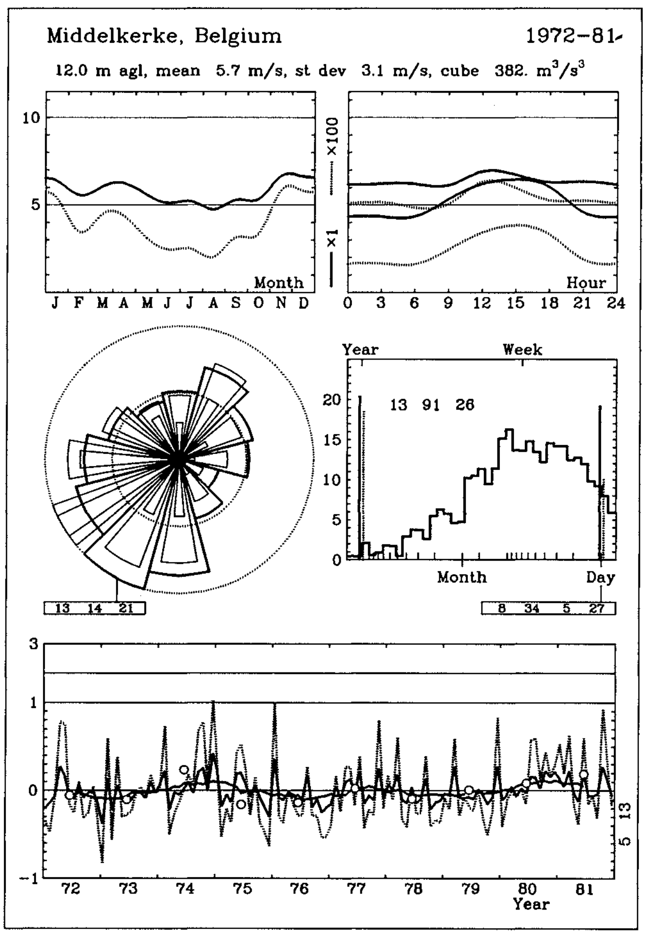
Middelkerke, Belgium
1972–81
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Month
Hour
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Day
13 14 21
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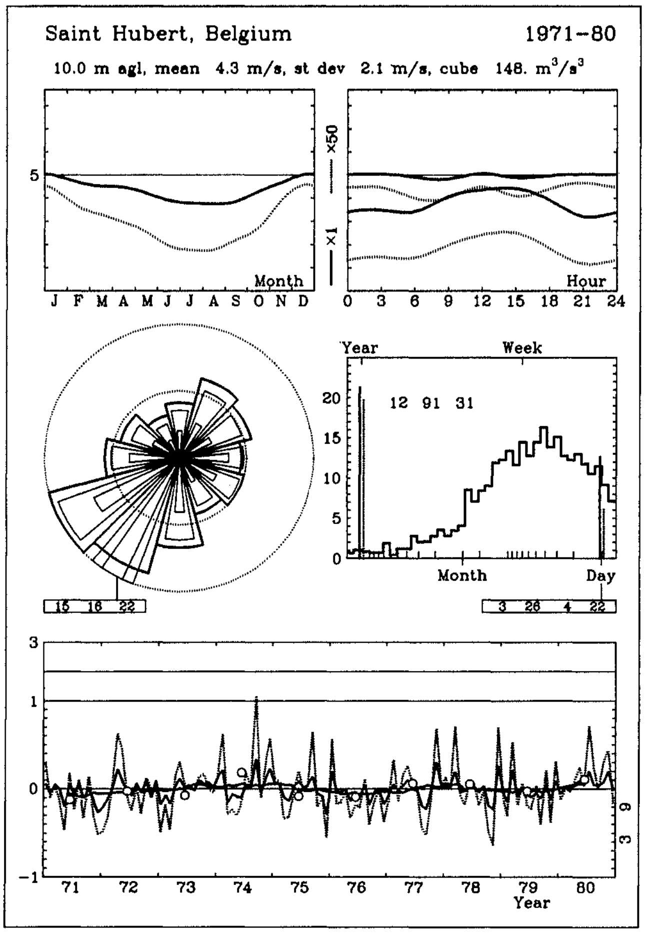
Year


Saint Hubert, Belgium
1971–80
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Month
J F M A M J J A S O N D
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×1
Hour
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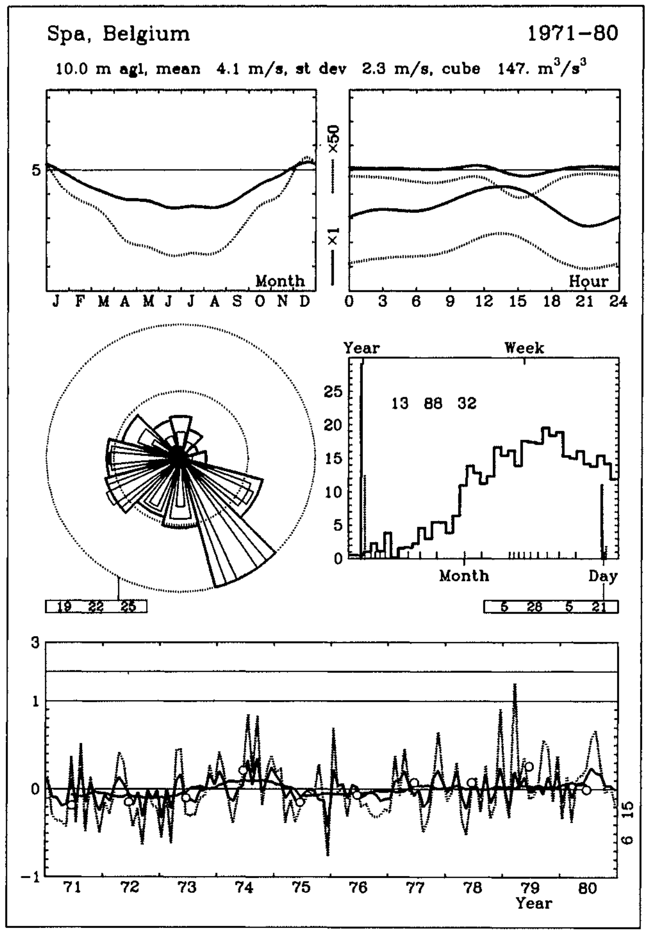
3


Spa, Belgium
1971–80
10.0 m agl, mean 4.1 m/s, st dev 2.3 m/s, cube 147. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
13 88 32
Month
Day
19 22 25
5 28 5 21
71 72 73 74 75 76 77 78 79 80
Year
15
6

Ålborg

57° 06′ 00″ N	09° 52′ 00″ E	UTM 32	E 552508 m	N 6328993 m	3 m a.s.l.

Location in the northern part of Jutland by the inlet separating N-Jutland from the rest of Jutland (Limfjorden). The city centre of Ålborg is situated about 6 km to the SE. The distances to the W and E coast, the North Sea and Kattegat are 25 and 30 km, respectively. The terrain is very flat and is characterized by the waters of Limfjorden, moors, and some areas with shelterbelts.
The anemometer is placed E of the runways in very open terrain with a few lines of trees in some sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1500	0.30	3000	0.10								
30	0.01	2000	0.30	4000	0.10								
60	0.01	1500	0.10										
90	0.01	1500	0.10										
120	0.01	1900	0.30	6000	0.10								
150	0.01	1500	0.15	3000	0.30								
180	0.01	5000	0.15										
210	0.01												
240	0.01	1700	0.00										
270	0.01	2500	0.00	6000	0.10								
300	0.01	2500	0.10										
330	0.01	1700	0.15										

Height of anemometer: 10.0 m a.g.l. Period: 65010100–72123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.4	121	108	124	191	135	103	61	52	44	49	10	2	1	0	4.7	1.62
30	5.4	88	112	139	187	158	93	63	50	56	41	12	2	1	0	4.7	1.65
60	8.2	66	95	122	148	144	105	85	74	69	71	17	5	0	0	5.5	1.79
90	8.6	84	103	95	130	130	101	75	64	68	99	31	15	2	0	5.8	1.69
120	10.6	55	70	88	103	115	107	88	80	90	111	57	29	7	1	6.9	1.89
150	6.4	79	65	70	118	123	117	85	87	83	88	53	22	3	5	6.6	1.80
180	8.1	72	97	100	125	147	121	79	76	61	70	34	16	0	2	5.8	1.70
210	9.7	52	68	90	111	128	120	89	101	79	96	43	18	4	1	6.6	1.94
240	12.9	35	42	49	92	115	113	101	105	106	130	70	31	8	6	7.8	2.17
270	13.2	32	25	45	69	105	104	101	104	113	160	82	41	14	5	8.4	2.41
300	8.7	50	48	65	93	89	107	69	90	106	139	88	42	10	5	8.0	2.18
330	3.8	137	97	111	156	136	110	64	63	43	42	27	10	3	0	5.0	1.56
Total	100.0	63	70	84	116	123	109	84	84	83	103	50	23	5	3	6.6	1.83

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.0	5.5	6.8	5.3	4.4	4.1	4.6	3.9	4.7	5.3	5.8	5.7	5.2
3	6.4	5.5	6.6	5.2	4.4	4.1	4.5	3.8	4.7	5.3	5.7	5.7	5.1
6	6.3	5.6	6.4	5.3	5.3	5.0	5.0	3.9	4.7	5.2	5.9	5.7	5.4
9	6.2	5.9	7.5	6.8	6.7	6.2	6.3	5.7	6.4	6.0	6.4	5.8	6.3
12	6.4	6.2	8.3	7.5	7.4	6.8	6.7	6.4	7.1	6.9	6.9	6.1	6.9
15	6.3	5.9	8.0	7.6	7.4	6.9	6.9	6.3	6.8	6.4	6.2	5.6	6.7
18	6.3	5.5	6.9	6.3	6.2	5.9	6.1	5.0	5.0	5.6	6.0	5.5	5.9
21	6.1	5.6	6.8	5.3	4.6	4.3	4.8	4.0	4.8	5.5	6.0	5.6	5.3
Day	6.2	5.7	7.2	6.2	5.8	5.4	5.6	4.9	5.5	5.8	6.1	5.7	5.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.8	6.7	7.6	8.1	9.3	9.4	8.2	8.4	8.6	10.3	10.7	8.5	8.8
	1.92	1.96	2.10	1.99	2.05	2.02	1.96	2.19	2.11	2.64	2.49	1.87	2.08
25	7.5	7.4	8.3	8.8	10.1	10.3	9.0	9.2	9.4	11.2	11.7	9.3	9.7
	1.98	2.03	2.17	2.05	2.09	2.06	2.01	2.26	2.17	2.69	2.53	1.90	2.12
50	8.1	7.9	8.9	9.4	10.8	11.0	9.6	9.8	10.1	12.0	12.5	9.9	10.3
	2.03	2.08	2.23	2.10	2.15	2.11	2.06	2.32	2.22	2.77	2.60	1.96	2.18
100	8.7	8.6	9.7	10.2	11.6	11.8	10.4	10.6	10.9	12.9	13.3	10.7	11.1
	1.96	2.01	2.16	2.05	2.11	2.08	2.01	2.25	2.17	2.71	2.56	1.92	2.13
200	9.6	9.5	10.7	11.2	12.6	12.7	11.3	11.7	11.9	14.0	14.4	11.6	12.1
	1.86	1.90	2.04	1.96	2.04	2.01	1.93	2.15	2.07	2.62	2.48	1.85	2.06
Freq	4.2	5.1	7.4	8.5	10.1	7.6	7.6	9.3	12.1	13.1	9.9	5.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.7	5.4	5.7	6.8	6.7	5.5	6.0	6.2	7.6	7.7	5.1	6.2
	1.61	1.65	1.80	1.69	1.88	1.78	1.69	1.95	1.86	2.39	2.15	1.56	1.82
25	5.6	5.6	6.5	6.8	8.1	7.9	6.6	7.2	7.3	8.9	9.0	6.1	7.4
	1.74	1.78	1.94	1.78	1.96	1.86	1.81	2.08	1.98	2.51	2.23	1.66	1.92
50	6.5	6.5	7.5	7.8	9.1	8.9	7.6	8.2	8.4	10.1	10.2	7.1	8.4
	1.96	2.00	2.18	1.94	2.08	1.97	1.99	2.31	2.17	2.69	2.36	1.83	2.08
100	7.7	7.8	8.9	9.0	10.4	10.2	8.9	9.7	9.8	11.5	11.6	8.3	9.8
	2.08	2.13	2.32	2.09	2.24	2.12	2.13	2.47	2.32	2.89	2.53	1.96	2.24
200	9.6	9.6	11.1	10.9	12.2	11.9	10.8	11.8	11.9	13.6	13.5	10.1	11.8
	1.99	2.03	2.22	2.01	2.17	2.05	2.04	2.37	2.23	2.79	2.46	1.88	2.19
Freq	4.4	5.4	8.1	8.6	10.5	6.5	8.1	9.7	12.9	13.1	8.8	3.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.1	4.7	5.1	6.0	5.8	4.8	5.3	5.4	6.6	6.7	4.3	5.4
	1.65	1.66	1.80	1.71	1.90	1.78	1.73	1.98	1.87	2.39	2.13	1.56	1.83
25	5.1	5.1	5.9	6.2	7.3	7.0	6.0	6.5	6.7	8.0	8.1	5.4	6.7
	1.77	1.78	1.93	1.80	1.97	1.85	1.83	2.10	1.98	2.49	2.20	1.66	1.92
50	6.0	6.0	6.9	7.2	8.4	8.1	7.0	7.6	7.8	9.2	9.3	6.3	7.7
	1.96	1.97	2.14	1.94	2.08	1.95	1.99	2.30	2.13	2.64	2.31	1.83	2.06
100	7.1	7.2	8.2	8.5	9.7	9.3	8.3	8.9	9.1	10.7	10.6	7.5	9.1
	2.15	2.16	2.35	2.13	2.28	2.13	2.19	2.52	2.35	2.89	2.52	2.01	2.26
200	8.8	8.9	10.1	10.1	11.4	10.9	10.0	10.9	10.9	12.6	12.4	9.2	10.8
	2.06	2.07	2.25	2.05	2.20	2.07	2.11	2.42	2.26	2.80	2.45	1.92	2.21
Freq	4.5	5.6	8.2	8.7	10.3	6.6	8.2	10.0	12.8	12.9	8.4	3.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.3	3.8	4.1	4.7	4.4	3.9	4.2	4.3	5.2	5.1	3.4	4.3
	1.64	1.67	1.81	1.75	1.90	1.75	1.79	2.03	1.90	2.37	2.05	1.56	1.84
25	4.2	4.4	5.0	5.4	6.2	5.7	5.1	5.6	5.7	6.8	6.6	4.4	5.6
	1.74	1.77	1.92	1.83	1.97	1.81	1.88	2.14	1.98	2.45	2.11	1.65	1.92
50	5.1	5.3	6.0	6.4	7.3	6.8	6.2	6.7	6.8	8.0	7.9	5.4	6.7
	1.89	1.92	2.08	1.93	2.06	1.89	2.02	2.30	2.11	2.57	2.20	1.78	2.03
100	6.2	6.4	7.2	7.7	8.6	8.1	7.4	8.0	8.1	9.4	9.2	6.5	8.0
	2.15	2.19	2.37	2.13	2.22	2.05	2.28	2.60	2.34	2.79	2.36	2.03	2.24
200	7.6	7.8	8.8	9.1	10.1	9.5	8.9	9.6	9.7	11.2	10.8	7.9	9.5
	2.08	2.11	2.28	2.11	2.23	2.06	2.21	2.52	2.30	2.79	2.38	1.96	2.23
Freq	4.6	5.9	8.3	8.9	9.8	6.8	8.4	10.4	12.8	12.3	7.8	3.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.8	541	5.5	219	4.8	145	3.8	70
25	8.5	691	6.6	343	5.9	252	5.0	149
50	9.1	826	7.5	471	6.9	365	5.9	241
100	9.8	1048	8.7	689	8.0	538	7.1	371
200	10.7	1405	10.4	1219	9.6	942	8.4	637

Beldringe

55° 28′ 30″ N	10° 20′ 18″ E	UTM 32	E 584598 m	N 6148599 m	17 m a.s.l.

Location on the island of Fyn, 10 km NW of the city centre of Odense. The terrain is gently rolling with small villages, small woods and some shelterbelts. The anemometer is located south of the runway of the airport of Beldringe. The airport buildings appear in the SW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.05	1000	0.15	16000	0.00						
30	0.01	900	0.20	3000	0.15	13000	0.00						
60	0.01	800	0.15	14000	0.00								
90	0.01	500	0.03	900	0.15	7000	0.01						
120	0.01	700	0.10	2000	0.15	27000	0.00						
150	0.01	600	0.15	5000	0.30								
180	0.01	600	0.15	5000	0.30								
210	0.01	300	0.20	600	0.10	1500	0.15						
240	0.01	350	0.20	550	0.03	2000	0.15						
270	0.01	1000	0.03	1500	0.15								
300	0.01	1000	0.15	19000	0.00								
330	0.01	1100	0.15	16000	0.00								

Height of anemometer: 8.0 m a.g.l. Period: 72100100-79103121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.6	285	105	116	119	112	73	81	57	21	23	5	2	0	0	3.9	1.47
30	4.9	215	102	121	110	140	105	87	55	33	23	8	1	0	0	4.5	1.73
60	6.4	188	134	120	118	133	89	87	47	22	26	16	12	6	3	4.6	1.41
90	8.0	152	101	117	137	139	113	93	52	39	47	9	2	0	0	4.9	1.79
120	10.1	144	105	107	118	113	102	92	71	49	54	17	7	0	20	5.4	1.46
150	5.6	229	155	122	116	135	93	59	39	16	24	10	1	0	0	3.9	1.50
180	8.6	195	160	156	138	119	74	73	37	20	17	9	2	0	0	3.8	1.48
210	12.4	130	136	126	111	112	106	98	72	39	48	16	5	1	0	5.0	1.69
240	15.6	107	96	105	107	112	114	110	80	58	71	29	8	3	0	5.8	1.87
270	13.4	102	77	108	115	107	98	105	90	57	85	41	14	2	1	6.1	1.82
300	7.3	152	89	111	86	100	101	104	70	65	62	41	13	3	2	5.8	1.71
330	4.1	228	119	141	130	115	81	79	42	27	24	8	4	0	0	4.1	1.48
Total	100.0	156	112	119	116	117	99	93	65	42	50	21	7	1	2	5.1	1.59

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.2	3.9	3.9	3.6	2.6	2.6	2.5	2.1	3.1	3.4	4.6	5.3	3.5
3	4.2	4.0	4.0	3.6	2.6	2.5	2.3	2.1	3.0	3.5	4.4	5.4	3.5
6	4.3	4.1	4.2	4.1	3.5	3.8	3.6	2.7	3.2	3.5	4.6	5.5	3.9
9	4.7	4.4	5.4	5.5	4.6	4.5	4.7	4.6	5.3	4.6	5.0	5.7	4.9
12	5.0	4.9	6.0	6.0	5.3	5.2	5.1	5.1	5.9	5.3	5.7	6.0	5.5
15	4.7	4.5	6.0	5.9	5.3	5.3	5.0	5.1	5.7	5.0	5.1	5.7	5.3
18	4.7	4.1	4.7	4.5	4.1	4.4	4.2	3.5	3.9	4.0	4.6	5.4	4.3
21	4.5	4.0	4.3	3.6	2.7	2.9	2.8	2.4	3.3	3.7	4.7	5.3	3.7
Day	4.6	4.2	4.8	4.6	3.8	3.9	3.8	3.5	4.2	4.1	4.8	5.5	4.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	6.4	6.7	7.7	8.2	7.3	6.8	8.2	9.3	9.5	8.7	6.8	8.1
	1.71	1.79	1.56	2.13	2.27	2.03	2.01	2.07	2.35	2.37	2.10	1.69	2.02
25	6.6	7.1	7.3	8.4	8.9	8.0	7.4	9.0	10.1	10.4	9.5	7.4	8.8
	1.77	1.85	1.60	2.19	2.34	2.10	2.07	2.12	2.40	2.42	2.15	1.74	2.07
50	7.1	7.6	7.9	9.0	9.6	8.6	8.0	9.6	10.9	11.1	10.2	8.0	9.5
	1.81	1.90	1.65	2.25	2.40	2.15	2.12	2.18	2.47	2.49	2.21	1.79	2.12
100	7.7	8.2	8.5	9.8	10.4	9.3	8.6	10.4	11.7	12.0	11.0	8.6	10.2
	1.76	1.84	1.60	2.18	2.33	2.08	2.06	2.13	2.41	2.44	2.16	1.74	2.07
200	8.5	9.1	9.3	10.8	11.5	10.3	9.5	11.4	12.8	13.0	12.0	9.5	11.2
	1.67	1.74	1.52	2.06	2.20	1.98	1.95	2.03	2.31	2.34	2.07	1.64	1.99
Freq	3.7	4.7	6.1	7.4	8.6	6.4	7.7	11.7	15.2	14.4	9.0	4.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.5	4.6	5.4	5.7	4.7	4.7	6.0	6.7	6.8	5.9	4.1	5.6
	1.48	1.53	1.29	1.88	1.90	1.63	1.68	1.85	2.08	2.07	1.77	1.36	1.74
25	5.1	5.4	5.5	6.5	6.9	5.7	5.6	7.2	7.9	8.0	7.0	5.0	6.7
	1.60	1.65	1.38	2.04	2.05	1.76	1.81	1.96	2.19	2.18	1.87	1.46	1.85
50	5.9	6.3	6.4	7.5	7.9	6.6	6.5	8.2	9.0	9.1	8.1	5.8	7.7
	1.79	1.85	1.51	2.29	2.29	1.97	2.04	2.14	2.38	2.36	2.05	1.64	2.03
100	7.0	7.5	7.5	8.9	9.4	7.9	7.7	9.6	10.4	10.5	9.4	7.0	9.1
	1.90	1.98	1.62	2.44	2.44	2.10	2.17	2.30	2.55	2.54	2.20	1.74	2.17
200	8.7	9.3	9.1	11.1	11.6	9.8	9.6	11.6	12.5	12.6	11.3	8.6	11.0
	1.82	1.88	1.55	2.33	2.34	2.00	2.07	2.20	2.46	2.44	2.12	1.67	2.10
Freq	3.5	5.2	6.4	7.7	8.9	5.5	8.7	12.6	16.0	13.8	7.4	4.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.9	4.0	4.7	5.0	4.0	4.1	5.3	5.8	5.9	5.1	3.5	4.9
	1.49	1.49	1.30	1.90	1.90	1.60	1.67	1.87	2.10	2.08	1.75	1.37	1.74
25	4.6	4.8	4.9	5.8	6.2	5.0	5.1	6.5	7.1	7.2	6.2	4.4	6.1
	1.59	1.59	1.38	2.03	2.03	1.72	1.79	1.96	2.20	2.17	1.85	1.46	1.84
50	5.4	5.7	5.8	6.9	7.2	5.9	6.0	7.6	8.3	8.4	7.3	5.2	7.1
	1.76	1.76	1.49	2.25	2.24	1.90	1.98	2.12	2.37	2.33	2.00	1.62	1.99
100	6.5	6.8	6.9	8.2	8.6	7.1	7.1	8.9	9.6	9.7	8.5	6.2	8.3
	1.93	1.93	1.64	2.47	2.46	2.08	2.17	2.33	2.60	2.55	2.19	1.77	2.18
200	8.0	8.4	8.4	10.1	10.5	8.7	8.8	10.7	11.5	11.6	10.3	7.7	10.1
	1.85	1.85	1.58	2.37	2.36	1.99	2.08	2.24	2.51	2.47	2.11	1.70	2.12
Freq	3.6	5.3	6.5	7.8	8.9	5.4	9.0	13.1	16.1	13.4	7.0	4.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.1	3.2	3.8	3.9	3.2	3.4	4.3	4.6	4.6	3.9	2.8	3.9
	1.50	1.45	1.34	1.90	1.89	1.61	1.69	1.91	2.10	2.08	1.73	1.38	1.75
25	3.9	4.1	4.2	4.9	5.1	4.2	4.5	5.6	6.0	6.1	5.2	3.7	5.1
	1.59	1.53	1.40	2.02	1.99	1.71	1.79	2.00	2.19	2.16	1.81	1.47	1.83
50	4.7	4.9	5.1	6.0	6.2	5.1	5.4	6.7	7.2	7.2	6.2	4.5	6.1
	1.72	1.67	1.51	2.19	2.16	1.85	1.95	2.13	2.32	2.28	1.93	1.59	1.96
100	5.7	6.0	6.2	7.2	7.4	6.1	6.5	7.9	8.5	8.5	7.4	5.5	7.3
	1.96	1.89	1.70	2.50	2.46	2.11	2.22	2.37	2.56	2.51	2.17	1.81	2.18
200	7.0	7.3	7.5	8.8	9.1	7.5	8.0	9.5	10.1	10.2	8.9	6.7	8.8
	1.89	1.83	1.65	2.40	2.37	2.03	2.13	2.33	2.53	2.49	2.12	1.74	2.15
Freq	3.8	5.5	6.7	8.0	8.4	5.9	9.4	13.4	15.7	12.6	6.6	3.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	425	5.0	173	4.4	115	3.5	55
25	7.8	542	6.0	272	5.4	199	4.5	119
50	8.4	652	6.9	373	6.3	289	5.4	191
100	9.1	838	8.0	562	7.4	434	6.5	295
200	9.9	1155	9.8	1044	8.9	793	7.8	526

Horns Rev Fyrskib

55° 24′ 00″ N	07° 34′ 00″ E	UTM 32	E 409225 m	N 6140373 m	0 m a.s.l.

The surface is open sea in all directions.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00												
30	0.00												
60	0.00												
90	0.00												
120	0.00												
150	0.00												
180	0.00												
210	0.00												
240	0.00												
270	0.00												
300	0.00												
330	0.00												

Height of anemometer: 20.0 m a.g.l. Period: 62010100-80041603

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.7	20	38	59	92	128	144	113	103	92	95	57	34	16	8	7.4	1.90
30	3.6	24	32	74	103	141	137	133	100	88	94	41	18	10	8	7.1	1.90
60	8.8	21	36	69	96	126	131	115	89	70	106	76	40	18	6	7.4	1.85
90	7.1	14	27	47	75	93	119	108	108	90	138	102	45	25	10	8.5	2.14
120	6.1	12	22	26	57	75	92	96	119	96	160	127	77	23	18	9.4	2.33
150	11.1	15	25	45	73	96	105	110	101	88	142	106	55	25	15	8.7	2.09
180	5.9	16	31	51	74	92	122	121	117	80	113	84	50	30	19	8.3	1.87
210	5.9	14	20	48	68	85	110	123	103	82	140	93	59	34	20	8.7	1.97
240	15.7	8	17	40	60	90	103	110	110	98	154	105	55	30	21	9.0	2.12
270	9.4	12	22	41	56	76	91	105	103	97	148	105	74	37	32	9.4	2.07
300	6.7	8	14	36	46	75	82	98	106	104	164	119	72	43	34	9.8	2.14
330	14.8	8	19	38	50	75	88	97	105	103	155	125	67	38	31	9.6	2.16
Total	100.0	13	24	45	67	92	106	108	105	92	139	101	57	29	20	8.8	2.04

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	8.8	8.2	8.0	7.1	6.4	6.5	6.7	6.8	8.2	8.3	10.2	9.6	7.9
3	8.7	8.1	8.1	7.1	6.4	6.5	6.7	6.7	8.3	8.2	9.9	9.5	7.8
6	8.9	8.2	8.3	7.2	6.5	6.5	6.7	6.9	8.5	8.3	10.0	9.7	8.0
9	9.0	8.2	8.3	7.2	6.4	6.2	6.6	6.7	8.4	8.2	10.0	9.7	7.9
12	9.0	8.2	8.1	7.1	6.3	6.3	6.7	6.5	8.5	8.4	10.1	10.0	7.9
15	8.9	8.0	8.0	7.1	6.2	6.5	6.9	6.6	8.4	8.4	10.0	9.9	7.9
18	8.9	8.2	8.0	7.2	6.4	6.6	6.9	6.6	8.4	8.4	10.2	9.8	7.9
21	8.9	8.3	8.2	7.2	6.3	6.4	6.7	6.7	8.5	8.4	10.2	9.9	8.0
Day	8.9	8.2	8.1	7.1	6.4	6.4	6.7	6.7	8.4	8.3	10.1	9.8	7.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	6.4	7.3	8.0	8.7	8.1	7.8	8.3	8.5	8.9	9.1	9.0	8.3
	1.90	1.87	1.82	2.13	2.20	2.05	1.87	2.00	2.11	2.10	2.15	2.12	2.01
25	7.9	7.0	7.9	8.8	9.5	8.8	8.6	9.0	9.3	9.7	10.0	9.9	9.0
	1.96	1.93	1.88	2.20	2.26	2.11	1.92	2.05	2.17	2.15	2.20	2.17	2.07
50	8.5	7.6	8.5	9.4	10.1	9.5	9.2	9.7	10.0	10.4	10.7	10.6	9.7
	2.01	1.98	1.93	2.26	2.32	2.16	1.97	2.11	2.22	2.20	2.26	2.23	2.12
100	9.2	8.2	9.3	10.2	11.0	10.2	9.9	10.4	10.8	11.2	11.5	11.4	10.5
	1.94	1.92	1.87	2.18	2.26	2.10	1.91	2.05	2.17	2.15	2.21	2.18	2.07
200	10.2	9.0	10.2	11.3	12.1	11.3	10.9	11.5	11.8	12.2	12.5	12.4	11.5
	1.84	1.82	1.77	2.07	2.15	1.99	1.82	1.96	2.06	2.06	2.12	2.09	1.98
Freq	6.4	5.2	5.9	8.7	8.2	7.1	7.6	9.1	10.4	11.8	10.0	9.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	4.6	5.2	5.7	6.0	5.6	5.5	5.8	6.0	6.3	6.4	6.1	5.8
	1.57	1.54	1.59	1.81	1.84	1.69	1.63	1.74	1.80	1.82	1.87	1.78	1.72
25	5.9	5.5	6.2	6.8	7.1	6.7	6.6	6.9	7.2	7.5	7.6	7.3	6.9
	1.69	1.67	1.72	1.95	1.96	1.82	1.74	1.85	1.92	1.93	1.97	1.88	1.84
50	6.8	6.4	7.2	7.9	8.2	7.7	7.6	8.0	8.2	8.5	8.7	8.3	7.9
	1.90	1.87	1.93	2.19	2.18	2.03	1.93	2.05	2.11	2.10	2.14	2.06	2.03
100	8.1	7.6	8.6	9.4	9.6	9.1	9.0	9.4	9.6	9.9	10.1	9.7	9.3
	2.02	1.99	2.05	2.33	2.33	2.17	2.06	2.19	2.26	2.25	2.30	2.20	2.17
200	10.1	9.5	10.7	11.6	11.8	11.3	11.0	11.5	11.7	11.9	12.1	11.7	11.4
	1.93	1.90	1.96	2.23	2.23	2.08	1.98	2.10	2.17	2.17	2.21	2.12	2.09
Freq	6.1	5.4	6.6	8.6	7.9	7.2	8.0	9.4	10.8	11.4	9.9	8.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.0	4.6	5.0	5.1	4.8	4.8	5.1	5.3	5.5	5.6	5.3	5.0
	1.57	1.53	1.64	1.80	1.81	1.67	1.63	1.73	1.80	1.85	1.88	1.76	1.72
25	5.2	5.0	5.7	6.2	6.3	5.9	5.9	6.2	6.5	6.8	6.9	6.5	6.2
	1.68	1.63	1.76	1.92	1.92	1.78	1.73	1.83	1.90	1.94	1.97	1.86	1.83
50	6.2	5.9	6.7	7.2	7.4	7.0	7.0	7.3	7.5	7.8	8.0	7.5	7.2
	1.85	1.81	1.94	2.12	2.10	1.96	1.88	1.99	2.07	2.09	2.12	2.01	1.99
100	7.4	7.1	8.0	8.6	8.8	8.3	8.3	8.6	8.9	9.2	9.3	8.8	8.5
	2.04	1.98	2.13	2.33	2.31	2.15	2.07	2.19	2.27	2.30	2.33	2.20	2.19
200	9.1	8.7	9.8	10.6	10.7	10.2	10.1	10.4	10.7	11.0	11.1	10.6	10.4
	1.95	1.90	2.05	2.23	2.21	2.06	1.99	2.10	2.19	2.22	2.24	2.12	2.11
Freq	6.0	5.4	6.8	8.5	7.8	7.3	8.1	9.5	10.9	11.2	9.8	8.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.2	3.7	4.0	4.0	3.8	3.8	4.0	4.2	4.4	4.4	4.0	4.0
	1.57	1.55	1.69	1.82	1.80	1.67	1.66	1.75	1.81	1.87	1.88	1.73	1.74
25	4.3	4.3	4.8	5.2	5.3	5.0	5.1	5.3	5.4	5.7	5.8	5.3	5.2
	1.67	1.65	1.79	1.92	1.90	1.76	1.75	1.83	1.89	1.95	1.96	1.81	1.82
50	5.3	5.2	5.8	6.3	6.4	6.0	6.1	6.3	6.6	6.8	6.9	6.4	6.3
	1.81	1.79	1.94	2.08	2.04	1.90	1.88	1.97	2.02	2.08	2.08	1.93	1.96
100	6.4	6.3	7.1	7.6	7.6	7.3	7.3	7.6	7.8	8.1	8.2	7.6	7.5
	2.06	2.03	2.21	2.36	2.32	2.16	2.13	2.22	2.26	2.30	2.31	2.16	2.20
200	7.8	7.7	8.6	9.2	9.3	8.8	8.9	9.1	9.4	9.7	9.8	9.2	9.1
	1.98	1.96	2.13	2.28	2.24	2.08	2.06	2.15	2.21	2.27	2.28	2.11	2.14
Freq	5.9	5.5	7.2	8.4	7.7	7.4	8.3	9.7	11.1	10.9	9.8	8.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.3	456	5.1	187	4.5	123	3.5	60
25	8.0	580	6.1	292	5.5	214	4.6	127
50	8.6	698	7.0	400	6.4	310	5.6	205
100	9.3	901	8.2	606	7.6	466	6.7	315
200	10.2	1247	10.1	1146	9.2	863	8.0	568

Karup

56° 17′ 00″ N 09° 08′ 00″ E	UTM 32 E 508255 m N 6237761 m	52 m a.s.l.

Location in central Jutland on the old Alhede (heath), 75 km from the W coast and 60 km from the E coast. The landscape is flat and characterized by many shelterbelts, heath areas and forests. In the NW to NE sectors the heath extends 4 to 6 km and in the SE to SW sectors a forest extends 4 to 8 km.
The anemometer is placed N of the runways with no obstructions closer than 300 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	400	0.10										
30	0.03	250	0.10										
60	0.03	200	0.10										
90	0.03	200	0.10	500	0.03	2000	0.30						
120	0.03	2500	0.30										
150	0.03	1100	0.30										
180	0.03	800	0.30										
210	0.03	1000	0.30										
240	0.03	1250	0.30										
270	0.03	1100	0.30										
300	0.03	400	0.10										
330	0.03	400	0.10										

Height of anemometer: 10.0 m a.g.l. Period: 71010100–79103121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.5	240	116	139	138	96	88	88	41	29	16	8	1	1	0	4.0	1.49
30	4.4	214	124	117	117	123	95	86	54	35	27	8	1	0	0	4.4	1.62
60	6.0	144	90	108	99	111	111	107	75	57	59	24	12	0	0	5.6	1.81
90	8.3	126	91	109	132	122	129	103	78	48	43	12	5	0	0	5.3	1.93
120	8.9	105	76	101	111	111	103	123	80	56	79	29	15	8	1	6.1	1.81
150	7.0	138	90	96	137	128	127	107	62	36	52	22	4	0	1	5.3	1.82
180	8.2	102	77	129	144	154	129	103	64	44	38	12	3	0	0	5.2	1.96
210	13.0	96	90	119	134	132	126	111	67	45	58	17	4	1	0	5.4	1.89
240	12.6	100	84	103	116	114	118	119	68	55	73	38	8	3	1	5.9	1.85
270	13.0	91	69	83	100	118	117	126	92	64	76	40	17	5	1	6.4	1.97
300	9.0	103	56	74	100	105	100	112	108	71	100	52	13	6	0	6.7	2.06
330	5.0	198	123	125	125	102	94	86	45	36	44	11	7	2	0	4.5	1.47
Total	100.0	123	85	105	120	119	114	110	73	51	61	26	8	3	0	5.6	1.80

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.8	4.5	4.5	3.7	3.0	2.7	3.0	2.6	3.4	3.9	4.9	5.6	3.9
3	4.8	4.4	4.5	3.7	3.0	2.9	3.0	2.5	3.2	3.8	4.7	5.7	3.8
6	4.9	4.5	4.6	4.1	3.9	4.0	4.1	3.2	3.5	4.0	4.8	5.5	4.3
9	5.1	4.9	5.9	5.9	5.5	5.3	5.5	5.0	5.6	5.0	5.0	5.5	5.3
12	5.5	5.7	6.8	6.5	6.1	5.9	6.0	5.8	6.4	5.8	5.9	6.1	6.0
15	5.2	5.3	6.6	6.7	6.3	6.1	6.2	5.7	6.2	5.4	5.0	5.7	5.9
18	5.0	4.7	4.9	5.2	5.1	5.3	5.4	4.4	4.0	4.2	4.9	5.6	4.9
21	4.9	4.6	4.6	3.8	3.1	3.3	3.4	2.7	3.5	4.1	4.8	5.6	4.0
Day	5.0	4.8	5.3	4.9	4.5	4.4	4.6	4.0	4.5	4.5	5.0	5.7	4.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	7.5	8.8	9.2	9.4	9.3	9.1	9.3	9.6	10.3	10.7	9.3	9.4
	1.99	2.08	2.11	2.29	2.33	2.33	2.49	2.37	2.17	2.21	2.41	2.15	2.21
25	7.9	8.2	9.6	10.0	10.3	10.1	9.9	10.1	10.5	11.3	11.7	10.1	10.3
	2.05	2.15	2.15	2.34	2.38	2.38	2.55	2.42	2.21	2.25	2.45	2.19	2.25
50	8.5	8.8	10.3	10.7	11.0	10.8	10.6	10.8	11.2	12.0	12.5	10.8	11.0
	2.11	2.20	2.21	2.40	2.44	2.45	2.62	2.49	2.27	2.30	2.51	2.25	2.31
100	9.2	9.5	11.1	11.5	11.8	11.6	11.5	11.6	12.0	12.9	13.3	11.6	11.8
	2.04	2.14	2.17	2.35	2.39	2.40	2.55	2.43	2.23	2.27	2.47	2.20	2.27
200	10.2	10.5	12.1	12.6	12.9	12.7	12.6	12.7	13.0	13.9	14.4	12.6	12.8
	1.93	2.02	2.08	2.25	2.30	2.30	2.44	2.33	2.16	2.21	2.40	2.13	2.20
Freq	4.6	4.5	5.5	7.3	8.3	7.4	8.0	11.6	13.1	13.1	10.5	6.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	5.3	6.4	6.4	6.8	6.4	6.4	6.5	6.9	7.5	7.7	5.8	6.6
	1.70	1.76	1.88	2.01	2.05	2.02	2.16	2.03	1.92	2.02	2.22	1.70	1.94
25	5.9	6.3	7.6	7.6	8.0	7.6	7.6	7.7	8.2	8.8	9.1	6.8	7.9
	1.83	1.90	1.98	2.13	2.16	2.14	2.30	2.14	2.00	2.09	2.31	1.80	2.04
50	6.9	7.3	8.7	8.7	9.1	8.7	8.7	8.8	9.3	9.9	10.3	7.8	9.0
	2.06	2.13	2.13	2.32	2.33	2.33	2.55	2.33	2.13	2.20	2.45	1.96	2.20
100	8.2	8.7	10.0	10.1	10.5	10.1	10.2	10.2	10.6	11.3	11.7	9.1	10.3
	2.19	2.27	2.30	2.49	2.50	2.51	2.72	2.50	2.29	2.37	2.63	2.11	2.37
200	10.2	10.8	11.9	12.2	12.5	12.2	12.5	12.3	12.4	13.1	13.6	11.0	12.3
	2.10	2.17	2.21	2.40	2.41	2.41	2.61	2.41	2.21	2.30	2.55	2.03	2.31
Freq	4.5	4.5	5.9	7.7	8.3	7.1	8.4	12.8	13.0	13.1	9.5	5.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.6	5.7	5.6	5.9	5.6	5.6	5.7	6.1	6.6	6.8	4.7	5.8
	1.71	1.77	1.91	2.02	2.05	2.03	2.17	2.01	1.92	2.03	2.26	1.63	1.94
25	5.3	5.7	6.9	6.8	7.2	6.8	6.8	6.9	7.4	8.0	8.3	5.8	7.1
	1.83	1.89	1.99	2.13	2.15	2.14	2.30	2.11	1.99	2.09	2.34	1.73	2.03
50	6.3	6.8	8.0	7.9	8.4	7.9	8.0	8.1	8.5	9.1	9.5	6.8	8.2
	2.02	2.09	2.13	2.30	2.30	2.31	2.51	2.26	2.10	2.19	2.46	1.87	2.17
100	7.5	8.0	9.3	9.3	9.7	9.3	9.4	9.4	9.8	10.5	10.9	8.0	9.5
	2.22	2.30	2.33	2.53	2.51	2.54	2.76	2.49	2.30	2.39	2.69	2.06	2.38
200	9.2	9.9	11.1	11.2	11.5	11.2	11.4	11.2	11.5	12.2	12.7	9.6	11.3
	2.13	2.20	2.25	2.43	2.43	2.44	2.65	2.40	2.23	2.33	2.61	1.98	2.32
Freq	4.4	4.5	6.0	7.9	8.3	6.9	8.5	13.2	12.9	13.1	9.1	5.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.8	4.5	4.4	4.7	4.4	4.4	4.5	4.8	5.2	5.3	3.6	4.6
	1.72	1.78	1.92	2.03	2.07	2.05	2.15	2.00	1.94	2.06	2.23	1.62	1.95
25	4.5	4.9	5.8	5.8	6.1	5.7	5.7	5.9	6.3	6.8	6.8	4.7	5.9
	1.82	1.88	1.99	2.12	2.15	2.14	2.26	2.08	2.00	2.12	2.30	1.70	2.02
50	5.4	6.0	7.0	6.9	7.2	6.9	6.9	7.0	7.5	8.0	8.1	5.7	7.1
	1.98	2.04	2.10	2.25	2.27	2.28	2.42	2.21	2.09	2.20	2.40	1.83	2.13
100	6.5	7.2	8.3	8.2	8.6	8.2	8.2	8.3	8.8	9.4	9.5	6.8	8.4
	2.25	2.32	2.31	2.51	2.49	2.55	2.73	2.44	2.26	2.35	2.58	2.07	2.34
200	8.0	8.8	9.8	9.8	10.2	9.8	9.9	9.9	10.4	11.0	11.2	8.2	10.0
	2.17	2.24	2.29	2.46	2.47	2.49	2.65	2.41	2.27	2.38	2.60	2.00	2.34
Freq	4.4	4.6	6.3	8.1	8.1	7.0	9.0	13.4	12.9	12.8	8.6	4.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.3	615	5.9	246	5.1	163	4.0	79
25	9.1	787	7.0	388	6.3	284	5.3	169
50	9.7	941	7.9	533	7.3	413	6.3	272
100	10.4	1186	9.2	771	8.4	604	7.4	419
200	11.4	1571	10.9	1332	10.0	1035	8.9	707

Kastrup

55° 38′ 00″ N	12° 40′ 00″ E	UTM 33 E 353107 m	N 6167877 m	5 m a.s.l.

Located on the island of Amager - east of the island of Zealand. The city centre of Copenhagen is about 10 km to the N. The terrain is very flat and characterized by the waters of Øresund to the E and S, and the built-up areas of the suburbs of Copenhagen to the W and N.
The anemometer is placed E of the runways, close to the shoreline. The aircraft hangars and other airport buildings are found from NW to N at distances of 800-1200 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1200	0.00									-3	
30	0.01	1000	0.00										
60	0.01	800	0.00										
90	0.01	850	0.00										
120	0.01	1000	0.00										
150	0.01	1000	0.00										
180	0.01	1000	0.15	4000	0.00								
210	0.01	1000	0.03	3000	0.10	7000	0.00						
240	0.01	3500	0.10	6500	0.01	10000	0.30						
270	0.01	2000	0.30	5250	0.01	11000	0.30						
300	0.01	1750	0.30									-2	
330	0.01	1000	0.20									-8	

Height of anemometer: 10.0 m a.g.l. Period: 65010103-72123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.7	19	42	70	135	155	151	122	98	79	84	31	11	3	4	6.6	2.01
30	5.0	25	51	104	144	140	117	105	92	87	97	26	11	0	0	6.4	2.10
60	8.5	18	34	63	94	99	116	118	131	105	137	68	13	3	0	7.6	2.61
90	7.5	13	26	62	74	105	114	110	121	125	134	69	37	8	1	8.1	2.52
120	7.7	18	31	62	97	97	116	118	134	121	121	60	17	6	3	7.7	2.54
150	7.7	16	29	70	116	162	150	124	121	76	91	31	13	1	2	6.7	2.19
180	7.9	22	40	87	113	156	147	127	113	86	86	16	5	1	0	6.5	2.40
210	9.2	13	37	86	126	146	138	127	100	90	91	41	4	0	0	6.6	2.30
240	14.5	15	32	69	95	111	116	118	126	118	148	39	12	1	0	7.5	2.72
270	14.5	12	34	85	115	134	102	112	111	102	118	45	21	6	2	7.3	2.24
300	6.7	20	28	80	117	118	127	115	110	95	118	39	23	8	1	7.2	2.20
330	4.1	16	42	47	123	192	154	134	98	86	68	35	2	2	1	6.5	2.21
Total	100.0	16	35	74	110	131	126	119	115	100	113	43	15	3	1	7.1	2.32

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.2	6.4	6.4	5.6	5.0	4.7	4.8	4.7	5.6	5.9	7.3	6.8	5.9
3	7.2	6.2	6.5	5.6	5.0	4.7	4.8	4.7	5.4	5.8	7.1	6.7	5.8
6	7.2	6.4	6.5	5.8	5.4	5.4	5.5	5.0	5.6	5.8	7.2	6.6	6.0
9	7.2	6.9	7.1	6.3	6.0	5.9	6.1	5.8	6.7	6.7	7.5	6.7	6.6
12	7.2	6.9	7.4	6.6	6.5	6.5	6.5	6.3	6.9	7.0	7.7	6.9	6.9
15	7.0	6.8	7.4	6.7	6.8	6.4	6.5	6.4	6.8	6.8	7.6	6.6	6.8
18	7.1	6.6	6.7	6.1	6.1	5.9	5.8	5.6	5.7	6.1	7.5	6.7	6.3
21	7.1	6.5	6.5	5.7	5.3	5.0	4.9	4.9	5.6	6.1	7.4	6.8	6.0
Day	7.2	6.6	6.8	6.0	5.7	5.5	5.6	5.4	6.0	6.3	7.4	6.7	6.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	7.2	8.3	8.8	8.6	7.6	7.8	8.1	10.0	10.0	10.4	10.3	8.9
	1.99	2.10	2.54	2.48	2.52	2.23	2.34	2.29	3.10	2.61	2.45	2.47	2.37
25	8.5	7.8	9.1	9.6	9.4	8.3	8.6	8.9	10.9	10.9	11.3	11.2	9.7
	2.05	2.16	2.62	2.56	2.60	2.30	2.42	2.36	3.19	2.66	2.49	2.51	2.43
50	9.1	8.4	9.7	10.3	10.1	8.9	9.2	9.5	11.6	11.7	12.1	11.9	10.4
	2.10	2.22	2.69	2.62	2.67	2.36	2.48	2.42	3.27	2.74	2.56	2.58	2.49
100	9.9	9.1	10.5	11.1	10.9	9.7	10.0	10.3	12.6	12.6	12.9	12.8	11.3
	2.04	2.15	2.60	2.54	2.58	2.29	2.40	2.35	3.19	2.68	2.51	2.53	2.44
200	10.9	10.1	11.7	12.3	12.1	10.7	11.0	11.4	13.9	13.7	14.0	13.9	12.4
	1.93	2.03	2.47	2.41	2.44	2.17	2.28	2.22	3.04	2.58	2.43	2.45	2.35
Freq	6.4	5.2	8.1	7.6	7.7	7.7	7.8	9.0	13.8	14.5	7.8	4.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	5.1	5.9	6.2	5.9	5.2	5.5	5.8	7.1	7.1	7.5	7.0	6.2
	1.70	1.80	2.13	2.09	2.06	1.84	1.99	1.94	2.62	2.22	2.18	2.13	2.03
25	6.3	6.1	7.0	7.3	7.0	6.3	6.6	6.9	8.4	8.4	8.9	8.3	7.4
	1.83	1.95	2.30	2.25	2.22	1.99	2.15	2.09	2.79	2.34	2.27	2.24	2.17
50	7.3	7.1	8.1	8.5	8.1	7.3	7.7	8.0	9.6	9.6	10.0	9.4	8.5
	2.06	2.19	2.59	2.52	2.50	2.24	2.42	2.35	3.07	2.52	2.42	2.42	2.38
100	8.7	8.4	9.6	10.0	9.6	8.6	9.1	9.5	11.2	11.0	11.4	10.8	10.0
	2.19	2.33	2.76	2.69	2.66	2.38	2.57	2.50	3.29	2.71	2.60	2.60	2.56
200	10.8	10.4	12.0	12.4	12.0	10.7	11.3	11.9	13.6	13.1	13.3	12.8	12.2
	2.09	2.22	2.63	2.56	2.54	2.28	2.45	2.39	3.16	2.61	2.51	2.51	2.49
Freq	6.5	5.4	8.4	7.5	7.7	7.7	8.0	9.8	14.5	13.6	6.4	4.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.5	5.2	5.3	5.1	4.6	4.8	5.1	6.2	6.3	6.6	5.9	5.4
	1.73	1.86	2.14	2.09	2.03	1.89	1.98	1.95	2.59	2.23	2.20	2.10	2.04
25	5.7	5.6	6.3	6.6	6.3	5.7	6.0	6.3	7.6	7.6	8.0	7.2	6.7
	1.85	1.99	2.30	2.23	2.17	2.03	2.12	2.08	2.73	2.33	2.29	2.19	2.16
50	6.7	6.6	7.4	7.7	7.3	6.7	7.0	7.4	8.8	8.8	9.2	8.4	7.8
	2.04	2.20	2.54	2.46	2.41	2.24	2.35	2.30	2.96	2.48	2.41	2.35	2.35
100	7.9	7.8	8.8	9.1	8.7	8.0	8.3	8.8	10.3	10.2	10.5	9.7	9.2
	2.24	2.42	2.80	2.70	2.64	2.47	2.58	2.53	3.26	2.72	2.64	2.58	2.58
200	9.8	9.7	10.9	11.3	10.8	9.8	10.3	10.9	12.4	12.1	12.4	11.6	11.2
	2.15	2.32	2.67	2.59	2.53	2.36	2.47	2.42	3.13	2.63	2.56	2.49	2.51
Freq	6.4	5.7	8.3	7.6	7.7	7.7	8.2	10.2	14.5	12.9	6.2	4.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.7	4.1	4.2	3.9	3.7	3.8	4.1	4.9	4.9	5.2	4.5	4.3
	1.74	1.92	2.13	2.10	2.00	1.92	1.98	1.99	2.52	2.25	2.22	2.05	2.04
25	4.7	4.8	5.4	5.5	5.2	4.8	5.0	5.4	6.3	6.4	6.7	5.9	5.6
	1.85	2.03	2.26	2.22	2.12	2.04	2.10	2.10	2.64	2.33	2.29	2.14	2.14
50	5.7	5.8	6.5	6.6	6.2	5.8	6.1	6.6	7.6	7.7	8.0	7.0	6.7
	2.00	2.20	2.45	2.42	2.30	2.22	2.28	2.28	2.81	2.45	2.40	2.27	2.29
100	6.9	7.0	7.8	8.0	7.5	7.0	7.3	7.9	9.0	9.1	9.4	8.3	8.0
	2.28	2.51	2.80	2.75	2.62	2.53	2.60	2.59	3.14	2.69	2.59	2.52	2.57
200	8.4	8.6	9.5	9.7	9.2	8.6	8.9	9.6	10.8	10.8	11.0	10.0	9.7
	2.20	2.42	2.69	2.65	2.53	2.43	2.50	2.50	3.08	2.67	2.60	2.48	2.53
Freq	6.2	6.2	8.1	7.6	7.7	7.7	8.3	10.9	14.5	11.9	5.8	5.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	493	5.5	194	4.8	128	3.8	62
25	8.6	632	6.6	309	5.9	225	5.0	133
50	9.2	764	7.6	432	6.9	332	6.0	219
100	10.0	980	8.9	663	8.1	510	7.1	345
200	11.0	1339	10.8	1235	9.9	934	8.6	615

Rønne

55° 04′ 00″ N 14° 45′ 00″ E	UTM 33 E 484033 m N 6102371 m	16 m a.s.l.

Location at the coast of the island of Bornholm, 4 km SE of the city of Rønne. The coastline is marked by a 20-m high cliff. The landscape is rolling, with many villages, woods and shelterbelts. The anemometer is located south of the runway.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	400	0.30	1000	0.20	2200	0.30	4000	0.20	20000	0.00		
30	0.01	300	0.10	1500	0.20	20000	0.00						
60	0.01	400	0.20	21000	0.00								
90	0.01	400	0.20	22000	0.00								
120	0.01	500	0.30	1200	0.002	20000	0.00						
150	0.01	500	0.15	800	0.00								
180	0.01	500	0.00										
210	0.01	350	0.00										
240	0.01	300	0.00										
270	0.01	700	0.00										
300	0.01	2000	0.03	7000	0.00								
330	0.01	500	0.20	1500	0.30	8000	0.00						

Height of anemometer: 10.0 m a.g.l. Period: 72100106-79103118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.9	148	122	159	150	107	122	73	43	16	27	13	18	2	0	4.4	1.40
30	5.7	101	78	134	140	133	113	113	76	35	61	14	1	0	1	5.3	1.87
60	9.4	60	63	107	115	121	118	115	88	70	80	43	15	5	1	6.4	1.89
90	8.7	58	75	102	125	139	126	114	82	69	72	27	11	2	0	6.1	1.97
120	8.1	73	64	101	133	182	138	101	73	47	61	21	7	1	0	5.6	1.90
150	5.8	86	86	137	131	170	115	86	48	50	45	37	9	2	1	5.3	1.62
180	5.7	106	101	119	125	148	86	98	66	39	62	30	16	1	2	5.3	1.58
210	7.8	93	86	101	106	97	115	78	73	67	98	55	16	3	12	6.5	1.52
240	14.1	45	62	87	88	105	109	100	94	69	106	80	35	13	6	7.4	1.85
270	18.0	26	34	74	106	126	123	126	85	95	109	47	31	13	3	7.3	1.99
300	7.9	70	53	97	110	126	132	128	71	60	69	50	17	12	7	6.5	1.74
330	4.9	99	115	149	172	139	116	92	48	30	28	5	5	0	0	4.6	1.78
Total	100.0	68	69	104	118	130	119	106	76	62	78	41	18	6	3	6.3	1.74

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	5.7	4.7	4.9	4.8	4.5	4.5	4.4	4.2	5.0	5.1	6.9	6.8	5.1
9	5.9	5.2	5.6	5.6	5.2	4.9	5.1	5.0	5.8	6.0	7.1	7.0	5.7
12	6.1	5.5	6.0	5.8	5.4	5.2	5.2	5.5	6.0	5.9	7.2	7.1	5.9
15	5.8	5.2	6.0	5.4	5.2	4.9	5.2	5.1	5.8	5.7	6.8	6.9	5.7
18	6.0	4.9	5.3	4.7	4.6	4.2	4.5	4.1	4.9	5.3	7.0	6.9	5.2
21	5.6	4.0	5.2	4.1	2.7	2.6	4.2	1.6	3.4	3.7	9.0	7.0	4.3
Day	5.9	5.1	5.5	5.3	5.0	4.8	4.9	4.8	5.6	5.6	7.0	6.9	5.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	8.1	9.9	9.3	7.9	6.6	6.5	7.2	8.0	8.3	8.2	6.8	8.0
	2.06	2.15	2.09	2.32	2.19	1.72	1.74	2.00	2.17	2.31	2.05	1.90	2.03
25	7.3	8.9	10.8	10.2	8.7	7.2	7.1	7.8	8.8	9.1	9.0	7.5	8.8
	2.13	2.22	2.12	2.37	2.26	1.77	1.80	2.07	2.24	2.38	2.10	1.96	2.08
50	7.8	9.5	11.6	10.9	9.3	7.8	7.7	8.4	9.4	9.7	9.6	8.1	9.4
	2.18	2.28	2.17	2.44	2.32	1.82	1.85	2.12	2.30	2.45	2.16	2.01	2.13
100	8.5	10.3	12.4	11.7	10.1	8.4	8.3	9.1	10.3	10.6	10.4	8.7	10.2
	2.12	2.21	2.14	2.38	2.25	1.76	1.79	2.05	2.23	2.37	2.10	1.95	2.08
200	9.4	11.4	13.3	12.8	11.2	9.3	9.1	10.1	11.3	11.7	11.4	9.6	11.2
	2.00	2.10	2.08	2.29	2.13	1.67	1.69	1.95	2.11	2.24	1.99	1.84	2.00
Freq	4.2	5.8	8.8	8.7	7.7	6.1	5.9	6.9	13.6	16.5	10.1	5.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	6.0	7.2	6.4	5.3	4.5	4.5	5.2	5.7	5.8	5.7	4.5	5.6
	1.71	1.83	1.90	2.03	1.83	1.44	1.49	1.74	1.85	1.93	1.69	1.60	1.74
25	5.7	7.1	8.4	7.6	6.4	5.4	5.5	6.2	6.8	6.9	6.8	5.4	6.7
	1.84	1.94	1.97	2.16	1.98	1.56	1.61	1.88	2.00	2.08	1.81	1.73	1.86
50	6.6	8.1	9.5	8.7	7.4	6.3	6.4	7.2	7.8	8.0	7.8	6.3	7.7
	2.06	2.13	2.08	2.36	2.22	1.75	1.81	2.12	2.25	2.34	2.01	1.94	2.06
100	7.9	9.5	10.8	10.1	8.8	7.5	7.6	8.5	9.3	9.5	9.2	7.5	9.1
	2.20	2.28	2.24	2.53	2.37	1.86	1.92	2.25	2.39	2.49	2.15	2.06	2.21
200	9.8	11.5	12.6	12.2	11.0	9.3	9.4	10.6	11.6	11.9	11.3	9.3	11.2
	2.10	2.19	2.17	2.43	2.26	1.77	1.84	2.15	2.28	2.38	2.06	1.97	2.13
Freq	4.2	6.4	9.1	8.6	7.3	5.9	6.0	7.9	14.7	15.8	8.6	5.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	5.3	6.2	5.5	4.6	3.9	4.0	4.6	4.9	5.0	4.9	3.9	4.9
	1.71	1.81	1.90	2.01	1.78	1.44	1.52	1.76	1.87	1.91	1.69	1.58	1.74
25	5.3	6.5	7.5	6.8	5.7	4.9	5.0	5.6	6.1	6.2	6.0	4.8	6.0
	1.83	1.90	1.97	2.12	1.90	1.54	1.63	1.88	2.00	2.05	1.79	1.69	1.85
50	6.2	7.6	8.6	7.8	6.7	5.8	5.9	6.6	7.2	7.3	7.1	5.7	7.0
	2.03	2.05	2.07	2.30	2.11	1.70	1.80	2.08	2.21	2.26	1.96	1.87	2.01
100	7.4	8.9	9.9	9.2	7.9	6.9	7.1	7.9	8.5	8.7	8.4	6.8	8.3
	2.23	2.25	2.26	2.53	2.31	1.87	1.98	2.29	2.43	2.49	2.15	2.06	2.21
200	9.1	10.6	11.6	11.1	9.8	8.5	8.7	9.7	10.5	10.8	10.2	8.4	10.2
	2.13	2.17	2.19	2.43	2.21	1.79	1.89	2.19	2.33	2.38	2.06	1.97	2.15
Freq	4.4	6.7	9.1	8.5	7.2	5.9	6.1	8.6	14.9	15.1	8.3	5.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	4.3	4.8	4.3	3.6	3.0	3.2	3.6	3.9	4.0	3.8	3.1	3.8
	1.78	1.83	1.92	2.01	1.79	1.42	1.55	1.78	1.89	1.89	1.66	1.58	1.75
25	4.6	5.6	6.3	5.6	4.7	4.0	4.3	4.8	5.2	5.2	5.0	4.1	5.1
	1.89	1.90	1.98	2.10	1.89	1.51	1.64	1.88	2.00	2.01	1.75	1.68	1.84
50	5.6	6.7	7.4	6.7	5.7	4.9	5.2	5.8	6.2	6.3	6.0	4.9	6.1
	2.05	2.01	2.07	2.25	2.06	1.63	1.78	2.05	2.17	2.17	1.89	1.82	1.97
100	6.7	8.0	8.7	8.0	6.9	6.0	6.3	7.0	7.5	7.6	7.2	6.0	7.3
	2.34	2.20	2.23	2.53	2.35	1.86	2.03	2.33	2.48	2.47	2.15	2.07	2.22
200	8.2	9.5	10.3	9.6	8.5	7.3	7.6	8.6	9.2	9.3	8.8	7.3	8.9
	2.26	2.19	2.24	2.47	2.26	1.79	1.96	2.24	2.39	2.39	2.07	2.00	2.18
Freq	4.7	7.0	9.1	8.4	7.0	5.9	6.3	9.6	15.2	14.1	7.8	4.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.1	412	5.0	168	4.3	111	3.4	54
25	7.8	527	5.9	264	5.3	194	4.5	115
50	8.3	635	6.8	363	6.2	281	5.4	186
100	9.0	819	8.0	556	7.4	428	6.5	288
200	9.9	1138	9.9	1061	9.0	798	7.9	523

Skrydstrup

55° 14′ 00″ N 09° 16′ 00″ E	UTM 32 E 516959 m N 6120923 m	40 m a.s.l.

Location in southern Jutland 12 km W of the city of Haderslev, 25 km from the E coast and 40 km from the W coast (North Sea). The terrain is flat and characterized by small villages, small woods and many shelterbelts.
The anemometer is placed N of the runways with shelterbelts appearing at a short distance in the E through S to SW sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	700	0.30										
30	0.03	800	0.30										
60	0.03	800	0.30										
90	0.03	150	0.30	400	0.10	2000	0.30						
120	0.03	200	0.15	700	0.07	2500	0.30						
150	0.03	2500	0.30										
180	0.03	1000	0.30										
210	0.03	1000	0.30										
240	0.03	1700	0.30										
270	0.05	1700	0.25										
300	0.03	500	0.30										
330	0.03	800	0.30										

Height of anemometer: 10.0 m a.g.l. Period: 71010100-79103121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.3	268	139	120	159	107	79	49	20	15	41	4	0	0	0	3.7	1.43
30	4.3	267	183	146	143	91	63	43	24	19	16	3	0	0	0	3.2	1.35
60	7.2	157	119	119	132	116	96	95	61	40	36	18	9	2	2	4.9	1.54
90	9.6	158	120	134	154	124	98	84	57	32	29	9	1	0	0	4.5	1.67
120	11.0	125	122	134	156	136	101	85	50	38	41	10	2	0	0	4.7	1.69
150	5.0	223	167	155	157	105	76	46	32	23	12	4	0	0	0	3.5	1.48
180	6.9	189	151	147	154	125	90	72	31	19	16	6	1	0	0	3.9	1.60
210	9.5	142	121	118	136	117	113	93	58	31	43	22	4	0	0	4.9	1.67
240	12.1	116	96	102	119	118	101	111	70	52	72	33	6	2	0	5.6	1.77
270	15.0	117	101	108	116	111	112	104	63	50	67	30	13	5	2	5.7	1.67
300	10.6	106	88	105	124	114	116	108	75	54	68	29	10	3	0	5.8	1.82
330	4.6	191	109	117	151	113	99	92	43	26	39	14	2	1	1	4.5	1.55
Total	100.0	153	119	122	138	117	100	89	54	38	46	18	5	2	0	4.8	1.58

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.5	4.0	4.1	3.4	2.4	2.0	2.1	2.0	2.8	3.2	4.4	5.4	3.3
3	4.3	4.0	4.0	3.4	2.4	2.1	2.1	2.1	2.6	3.3	4.3	5.3	3.3
6	4.5	4.1	4.0	3.8	3.4	3.2	3.1	2.5	2.8	3.3	4.3	5.2	3.7
9	4.7	4.4	5.3	5.2	4.7	4.4	4.3	4.3	4.7	4.3	4.6	5.4	4.7
12	5.1	4.9	6.2	5.8	5.1	4.9	4.9	4.9	5.6	5.0	5.2	5.8	5.3
15	4.9	4.7	6.1	5.9	5.2	5.0	5.2	5.1	5.6	4.7	4.8	5.5	5.2
18	4.7	4.2	4.7	4.8	4.1	4.3	4.3	3.7	3.5	3.6	4.4	5.3	4.3
21	4.6	4.2	4.1	3.7	2.6	2.3	2.4	2.2	3.0	3.3	4.4	5.2	3.5
Day	4.6	4.3	4.8	4.5	3.7	3.5	3.6	3.3	3.8	3.9	4.5	5.4	4.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.0	5.8	7.5	8.6	8.6	7.4	6.6	8.1	9.1	9.6	9.7	8.9	8.5
	2.00	1.76	1.74	1.94	2.05	1.97	1.99	1.98	2.14	2.05	2.09	2.06	1.94
25	7.6	6.4	8.2	9.3	9.4	8.2	7.3	8.8	10.0	10.5	10.6	9.8	9.2
	2.06	1.81	1.77	1.98	2.10	2.03	2.06	2.03	2.18	2.08	2.13	2.11	1.97
50	8.2	6.9	8.8	10.0	10.0	8.8	7.8	9.4	10.7	11.2	11.3	10.4	9.9
	2.12	1.86	1.82	2.04	2.15	2.08	2.11	2.09	2.24	2.14	2.18	2.17	2.03
100	8.9	7.4	9.4	10.7	10.8	9.5	8.4	10.2	11.5	12.0	12.1	11.2	10.6
	2.05	1.80	1.78	1.99	2.10	2.02	2.05	2.04	2.20	2.11	2.15	2.12	1.99
200	9.8	8.2	10.3	11.6	11.8	10.5	9.3	11.1	12.5	13.0	13.1	12.2	11.6
	1.94	1.71	1.71	1.92	2.02	1.92	1.94	1.95	2.12	2.05	2.08	2.04	1.93
Freq	4.3	4.2	6.0	8.2	10.1	7.4	6.2	8.7	11.5	13.9	12.4	7.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	3.9	5.7	6.0	6.1	4.6	4.7	5.9	6.6	6.9	7.0	5.9	6.0
	1.68	1.38	1.63	1.70	1.81	1.58	1.71	1.74	1.92	1.80	1.95	1.74	1.71
25	5.4	4.7	6.8	7.1	7.2	5.6	5.7	7.0	7.8	8.1	8.3	7.0	7.1
	1.81	1.49	1.72	1.78	1.92	1.71	1.84	1.84	2.01	1.87	2.03	1.84	1.79
50	6.3	5.5	7.7	8.1	8.2	6.5	6.6	8.0	8.9	9.1	9.4	8.0	8.1
	2.04	1.67	1.87	1.92	2.09	1.92	2.07	2.00	2.17	1.98	2.16	2.00	1.93
100	7.5	6.5	9.0	9.4	9.5	7.7	7.8	9.3	10.2	10.4	10.7	9.3	9.3
	2.17	1.78	2.01	2.06	2.24	2.04	2.20	2.15	2.33	2.13	2.32	2.15	2.08
200	9.3	8.1	10.7	11.1	11.5	9.6	9.8	11.2	12.1	12.1	12.5	11.2	11.2
	2.07	1.70	1.93	1.99	2.15	1.95	2.10	2.07	2.25	2.06	2.25	2.06	2.03
Freq	4.2	4.3	6.6	8.7	10.4	6.1	6.7	9.4	12.1	14.6	11.3	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.3	5.1	5.3	5.3	3.8	4.2	5.2	5.8	6.0	6.2	5.0	5.2
	1.70	1.36	1.67	1.72	1.83	1.56	1.73	1.75	1.94	1.80	1.98	1.73	1.71
25	4.8	4.1	6.2	6.5	6.5	4.7	5.2	6.4	7.1	7.3	7.5	6.1	6.4
	1.81	1.46	1.75	1.79	1.92	1.67	1.85	1.84	2.02	1.86	2.06	1.82	1.79
50	5.6	4.9	7.2	7.5	7.5	5.6	6.1	7.4	8.2	8.4	8.6	7.1	7.4
	2.01	1.61	1.88	1.91	2.07	1.85	2.05	1.98	2.15	1.96	2.17	1.98	1.91
100	6.7	5.9	8.4	8.7	8.8	6.7	7.3	8.6	9.5	9.6	9.9	8.4	8.6
	2.20	1.76	2.06	2.10	2.28	2.03	2.25	2.17	2.36	2.13	2.37	2.17	2.09
200	8.3	7.2	10.0	10.3	10.6	8.2	9.0	10.3	11.2	11.2	11.7	10.1	10.3
	2.11	1.69	1.99	2.03	2.19	1.94	2.15	2.09	2.28	2.07	2.30	2.09	2.04
Freq	4.1	4.4	6.8	8.9	10.6	5.6	6.8	9.7	12.3	14.9	10.8	5.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.7	4.1	4.2	4.1	2.8	3.3	4.2	4.6	4.7	4.9	3.7	4.1
	1.67	1.35	1.71	1.74	1.84	1.57	1.71	1.78	1.95	1.81	2.01	1.71	1.72
25	3.9	3.6	5.3	5.4	5.4	3.8	4.4	5.4	6.0	6.1	6.3	4.9	5.3
	1.77	1.42	1.78	1.81	1.92	1.67	1.81	1.85	2.02	1.86	2.08	1.80	1.78
50	4.7	4.3	6.4	6.5	6.5	4.6	5.3	6.5	7.1	7.3	7.5	5.9	6.4
	1.93	1.54	1.89	1.90	2.05	1.81	1.97	1.96	2.13	1.93	2.17	1.94	1.88
100	5.7	5.3	7.6	7.7	7.7	5.5	6.5	7.7	8.4	8.6	8.9	7.1	7.6
	2.19	1.75	2.08	2.09	2.28	2.06	2.24	2.17	2.33	2.07	2.35	2.20	2.06
200	7.0	6.5	9.0	9.2	9.3	6.8	7.9	9.2	10.0	10.0	10.4	8.6	9.1
	2.12	1.69	2.06	2.08	2.24	1.98	2.16	2.14	2.32	2.09	2.36	2.12	2.06
Freq	4.1	4.5	7.0	9.3	10.4	5.2	7.2	10.1	12.5	14.8	10.2	4.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.5	509	5.3	209	4.6	138	3.6	67
25	8.2	649	6.3	326	5.7	239	4.8	142
50	8.8	775	7.2	444	6.6	345	5.7	228
100	9.4	981	8.3	639	7.6	498	6.7	348
200	10.3	1312	9.9	1116	9.1	864	8.0	590

Tirstrup

56° 18′ 00″ N 10° 37′ 00″ E	UTM 32 E 600045 m	N 6240782 m	25 m a.s.l.

Location at the eastern tip of Jutland (Mols), 15 km from the E coast and 8 km from the S coast. The landscape is rolling and characterized by small villages, shelterbelts, forests and the nearby sea. In the SW sector Mols Bjerge, a hilly area with many small hills rising to about 100 m, appears approximately 8 km from the site. A forest extends to the edge of the airport from E through S to NW.
The anemometer is placed S of the runways with the forests only 50 m away in the sectors 170°-220°.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1500	0.10										
30	0.03	1000	0.10										
60	0.03	1200	0.10	20000	0.00								
90	0.05	2500	0.30	15000	0.00								
120	0.03	100	0.30	11000	0.00								
150	0.03	50	0.30	9000	0.03	17000	0.30					-1	
180	0.03	50	0.30									-10	
210	0.03	50	0.30									-11	
240	0.03	100	0.30	8000	0.10							-2	
270	0.03	100	0.15	1000	0.30								
300	0.03	1400	0.30										
330	0.03	1000	0.30										

Height of anemometer: 10.0 m a.g.l. Period: 71010100-79103121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.6	281	99	105	96	112	86	79	57	32	41	11	0	0	0	4.2	1.49
30	4.8	278	105	90	105	108	105	80	55	21	38	15	1	0	0	4.3	1.51
60	5.6	242	86	88	92	110	91	97	78	43	46	19	7	0	0	5.0	1.63
90	6.9	188	78	91	112	141	99	87	60	60	61	16	7	1	0	5.2	1.72
120	9.1	184	113	99	121	125	102	93	61	40	46	16	2	0	0	4.9	1.69
150	7.8	268	156	116	124	112	74	61	46	18	17	9	1	0	0	3.7	1.40
180	8.8	234	186	136	129	104	90	58	31	16	13	1	0	0	0	3.5	1.47
210	10.9	202	166	136	139	127	94	72	37	15	10	1	0	0	0	3.8	1.66
240	13.0	163	148	139	130	139	117	80	45	20	15	4	1	0	0	4.2	1.77
270	15.0	122	88	101	123	125	113	99	75	54	60	24	10	3	2	5.6	1.75
300	9.6	167	90	85	101	114	96	86	72	55	77	38	13	4	1	5.7	1.63
330	4.1	353	114	98	108	88	66	52	35	34	39	9	2	2	0	3.5	1.22
Total	100.0	203	122	111	119	121	98	81	55	34	38	14	4	1	0	4.6	1.56

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.1	3.6	3.4	3.3	2.4	2.1	2.3	1.9	2.9	3.0	4.0	4.7	3.1
3	4.0	3.5	3.3	3.2	2.2	2.1	2.4	1.8	2.7	2.9	3.7	4.6	3.0
6	4.2	3.5	3.3	3.7	3.4	3.5	3.5	2.4	2.7	3.0	3.7	4.6	3.4
9	4.3	4.0	4.7	5.2	4.6	4.4	4.5	4.3	4.8	4.1	4.1	4.7	4.5
12	4.7	4.8	5.4	5.6	5.0	5.0	5.0	4.7	5.4	4.8	4.8	5.2	5.1
15	4.3	4.3	5.3	5.6	5.0	4.9	4.9	4.6	5.0	4.3	4.0	4.8	4.8
18	4.2	3.8	3.8	4.0	3.7	3.8	4.0	3.2	3.1	3.2	3.8	4.7	3.8
21	4.1	3.8	3.5	3.2	2.3	2.2	2.4	1.9	2.9	3.2	3.9	4.7	3.2
Day	4.2	3.9	4.1	4.2	3.6	3.5	3.6	3.1	3.7	3.5	4.0	4.7	3.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.8	7.2	7.6	8.0	8.8	8.5	8.1	8.9	8.9	10.0	9.9	7.9	8.7
	1.80	1.98	1.97	1.85	1.79	1.91	1.80	1.99	2.14	2.03	2.00	1.71	1.89
25	7.5	7.9	8.3	8.7	9.6	9.2	8.9	9.7	9.7	10.9	10.8	8.6	9.5
	1.86	2.04	2.03	1.89	1.82	1.95	1.83	2.03	2.19	2.05	2.03	1.74	1.92
50	8.1	8.4	8.9	9.4	10.2	9.9	9.5	10.3	10.4	11.6	11.5	9.2	10.2
	1.90	2.09	2.08	1.94	1.87	2.00	1.88	2.08	2.25	2.10	2.07	1.78	1.97
100	8.7	9.2	9.6	10.1	11.0	10.6	10.2	11.1	11.2	12.4	12.3	9.9	10.9
	1.85	2.03	2.02	1.90	1.83	1.96	1.85	2.04	2.20	2.08	2.05	1.75	1.94
200	9.6	10.1	10.6	11.0	11.9	11.5	11.1	12.0	12.2	13.4	13.2	10.7	11.8
	1.75	1.92	1.92	1.81	1.77	1.89	1.78	1.97	2.11	2.02	1.99	1.69	1.88
Freq	4.4	4.7	5.2	6.4	8.1	8.0	8.2	10.2	12.6	14.6	11.6	5.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	5.0	5.3	5.7	6.3	5.6	5.8	6.3	6.2	7.4	6.8	4.8	6.1
	1.59	1.66	1.66	1.62	1.60	1.60	1.59	1.79	1.88	1.85	1.77	1.36	1.67
25	5.8	6.0	6.4	6.8	7.5	6.6	6.9	7.5	7.4	8.7	8.0	5.7	7.3
	1.72	1.79	1.78	1.71	1.67	1.69	1.67	1.88	1.99	1.92	1.84	1.43	1.75
50	6.8	7.0	7.4	7.8	8.5	7.6	7.9	8.5	8.4	9.8	9.1	6.6	8.3
	1.93	2.01	1.98	1.87	1.77	1.83	1.78	2.02	2.16	2.01	1.95	1.55	1.88
100	8.1	8.3	8.7	9.1	9.7	8.8	9.1	9.8	9.8	11.1	10.3	7.7	9.5
	2.05	2.14	2.12	2.01	1.91	1.97	1.92	2.17	2.32	2.15	2.09	1.66	2.02
200	10.0	10.3	10.7	10.9	11.4	10.6	10.7	11.6	11.8	12.7	12.0	9.1	11.3
	1.96	2.05	2.03	1.93	1.85	1.89	1.85	2.10	2.23	2.10	2.03	1.60	1.97
Freq	4.6	4.7	5.4	6.8	8.6	7.7	8.5	10.8	13.1	15.0	10.3	4.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.4	4.7	5.0	5.6	4.7	5.1	5.5	5.4	6.6	5.8	3.8	5.3
	1.62	1.67	1.67	1.64	1.62	1.58	1.60	1.81	1.88	1.88	1.76	1.30	1.67
25	5.3	5.4	5.8	6.2	6.8	5.8	6.3	6.8	6.6	7.9	7.1	4.7	6.5
	1.74	1.78	1.78	1.73	1.68	1.66	1.67	1.88	1.98	1.93	1.82	1.37	1.74
50	6.2	6.4	6.8	7.2	7.8	6.8	7.3	7.8	7.7	9.1	8.2	5.6	7.6
	1.92	1.97	1.95	1.86	1.77	1.78	1.77	2.01	2.13	2.01	1.91	1.47	1.85
100	7.4	7.6	8.0	8.4	9.1	8.0	8.4	9.1	9.0	10.4	9.4	6.6	8.8
	2.11	2.16	2.14	2.04	1.93	1.96	1.94	2.20	2.34	2.17	2.08	1.62	2.03
200	9.1	9.4	9.8	10.1	10.6	9.5	9.9	10.8	10.8	12.0	11.0	7.9	10.4
	2.02	2.07	2.06	1.97	1.88	1.89	1.88	2.13	2.26	2.13	2.03	1.56	1.99
Freq	4.6	4.7	5.5	6.9	8.7	7.6	8.6	11.0	13.4	15.1	9.9	4.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.5	3.8	4.0	4.3	3.7	4.1	4.3	4.3	5.2	4.5	3.0	4.2
	1.65	1.69	1.71	1.65	1.60	1.57	1.63	1.81	1.88	1.88	1.74	1.33	1.68
25	4.4	4.6	4.9	5.3	5.6	4.9	5.3	5.7	5.7	6.7	5.9	4.0	5.5
	1.74	1.79	1.79	1.72	1.65	1.64	1.69	1.88	1.96	1.93	1.79	1.39	1.74
50	5.4	5.6	5.9	6.3	6.7	5.9	6.4	6.8	6.8	7.9	7.0	4.8	6.6
	1.89	1.94	1.93	1.82	1.72	1.74	1.77	1.98	2.07	2.00	1.87	1.49	1.83
100	6.5	6.7	7.2	7.5	7.9	7.0	7.5	8.0	8.0	9.2	8.3	5.8	7.8
	2.15	2.21	2.19	2.02	1.86	1.92	1.93	2.17	2.28	2.12	2.02	1.67	1.99
200	8.0	8.2	8.7	9.0	9.3	8.4	8.9	9.5	9.6	10.8	9.7	7.0	9.2
	2.08	2.13	2.12	1.99	1.87	1.90	1.92	2.16	2.26	2.15	2.03	1.62	2.00
Freq	4.6	4.8	5.6	7.0	8.8	7.6	8.9	11.5	13.6	14.6	9.0	4.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.7	570	5.5	236	4.8	155	3.8	75
25	8.4	727	6.5	366	5.8	268	4.9	159
50	9.0	864	7.3	495	6.7	384	5.8	255
100	9.7	1087	8.5	700	7.8	549	6.9	385
200	10.5	1440	10.0	1200	9.3	934	8.2	643

Værløse

55° 46′ 00″ N	12° 19′ 00″ E	UTM 33	E 331653 m	N 6183507 m	19 m a.s.l.

Location 10 km W of Copenhagen. The terrain is open in the SW–NW sectors and it has many built-up areas and forests in the NE–SW sectors.
The anemometer is placed S of the runways with the closest obstruction 600 m away.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.10										
30	0.01	600	0.10	2000	0.30								
60	0.01	1000	0.00	2000	0.30								
90	0.01	1100	0.30										
120	0.01	900	0.30										
150	0.01	500	0.30										
180	0.01	400	0.30										
210	0.01	400	0.10	1000	0.30								
240	0.01	1200	0.15										
270	0.01	1750	0.15										
300	0.01	1250	0.15										
330	0.01	800	0.20										

Height of anemometer: 10.0 m a.g.l. Period: 72100100–79103121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.3	332	137	118	108	86	88	57	32	18	20	2	1	0	0	3.3	1.30
30	4.4	305	137	143	128	103	91	49	22	11	9	0	1	0	0	3.2	1.43
60	5.2	240	109	117	129	126	104	69	46	16	29	10	4	1	0	4.2	1.53
90	10.5	175	110	121	112	130	100	79	50	37	60	22	5	0	0	4.9	1.60
120	9.3	154	102	90	113	136	112	87	68	52	57	20	3	1	0	5.3	1.78
150	8.5	183	126	132	130	137	95	86	47	23	33	7	1	0	0	4.4	1.67
180	7.8	229	170	162	136	133	77	50	18	11	9	4	1	0	0	3.4	1.50
210	9.8	185	125	145	130	124	88	71	35	22	24	2	0	0	0	4.0	1.63
240	12.8	145	117	107	120	131	114	103	56	47	37	17	2	2	1	5.1	1.75
270	14.0	122	85	90	108	115	102	106	66	57	78	46	17	7	0	6.0	1.71
300	8.1	167	91	90	105	101	101	96	63	52	71	35	21	6	1	5.7	1.60
330	5.4	236	103	91	128	130	110	84	42	29	32	9	2	2	1	4.5	1.60
Total	100.0	186	115	115	120	123	100	83	49	36	43	18	6	2	0	4.7	1.55

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.5	3.6	4.2	3.2	2.6	2.0	2.1	1.8	3.0	3.4	4.1	4.8	3.3
3	4.2	3.7	4.0	3.4	2.5	2.1	2.1	1.9	2.8	3.5	4.1	4.8	3.3
6	4.1	3.8	4.0	4.0	3.5	3.5	3.2	2.6	3.0	3.6	4.2	4.9	3.7
9	4.5	4.4	5.3	5.1	4.6	4.4	4.4	4.2	5.1	4.7	4.7	5.0	4.7
12	4.9	5.0	6.1	5.8	5.2	4.6	4.8	4.8	5.6	5.5	5.3	5.4	5.3
15	4.7	4.8	5.9	5.7	5.1	4.7	5.0	4.7	5.2	4.8	4.5	5.0	5.0
18	4.4	4.2	4.6	4.3	4.0	4.2	3.8	3.0	3.4	4.0	4.1	4.8	4.1
21	4.3	3.7	4.3	3.3	2.3	2.6	2.2	2.0	3.0	3.6	4.1	4.9	3.4
Day	4.4	4.1	4.8	4.4	3.7	3.5	3.5	3.1	3.9	4.1	4.4	4.9	4.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	5.3	5.9	7.7	8.2	7.8	6.5	6.7	7.8	8.6	8.6	7.7	7.5
	1.89	1.73	1.83	2.04	2.10	2.15	1.97	1.98	2.24	2.08	2.02	2.08	1.97
25	6.7	5.8	6.5	8.4	8.9	8.5	7.1	7.4	8.5	9.4	9.4	8.4	8.2
	1.95	1.78	1.89	2.10	2.16	2.22	2.03	2.05	2.31	2.13	2.06	2.15	2.02
50	7.2	6.2	6.9	9.1	9.6	9.1	7.6	7.9	9.1	10.1	10.1	9.1	8.8
	2.00	1.83	1.94	2.15	2.22	2.28	2.08	2.10	2.38	2.19	2.12	2.20	2.07
100	7.8	6.7	7.5	9.8	10.4	9.9	8.3	8.6	9.9	10.9	10.8	9.8	9.6
	1.94	1.77	1.88	2.09	2.16	2.21	2.02	2.03	2.30	2.14	2.07	2.13	2.02
200	8.6	7.4	8.3	10.8	11.4	10.9	9.1	9.5	11.0	11.9	11.8	10.8	10.5
	1.84	1.68	1.78	1.98	2.06	2.09	1.91	1.92	2.18	2.06	1.99	2.02	1.94
Freq	4.5	4.3	5.3	8.4	9.1	8.3	8.1	9.1	11.9	14.2	10.6	6.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	3.6	4.2	5.6	5.8	5.3	4.2	4.9	5.5	6.3	6.0	5.1	5.2
	1.48	1.46	1.56	1.76	1.81	1.81	1.59	1.73	1.91	1.82	1.76	1.79	1.69
25	4.7	4.4	5.1	6.7	6.9	6.3	5.0	5.9	6.6	7.4	7.1	6.1	6.3
	1.59	1.57	1.69	1.88	1.93	1.96	1.71	1.87	2.06	1.92	1.85	1.93	1.80
50	5.4	5.1	5.9	7.7	7.9	7.3	5.9	6.8	7.6	8.5	8.1	7.1	7.2
	1.78	1.76	1.90	2.08	2.12	2.20	1.92	2.10	2.31	2.07	2.01	2.17	1.98
100	6.5	6.1	7.0	9.0	9.3	8.7	7.0	8.1	9.0	9.8	9.4	8.4	8.5
	1.90	1.87	2.02	2.23	2.28	2.34	2.05	2.24	2.47	2.22	2.16	2.31	2.12
200	8.0	7.5	8.7	11.1	11.3	10.8	8.7	10.1	11.2	11.7	11.3	10.4	10.5
	1.81	1.79	1.93	2.13	2.18	2.23	1.96	2.13	2.35	2.14	2.08	2.21	2.06
Freq	4.2	4.4	5.6	9.6	8.6	8.3	8.2	9.3	12.9	14.5	8.9	5.6	100.0

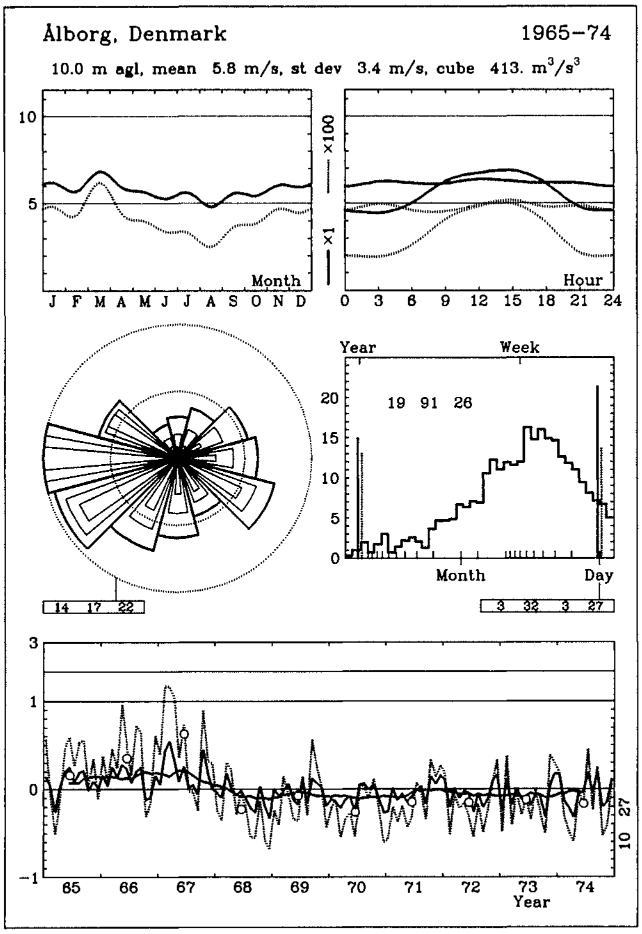
Roughness Class 2

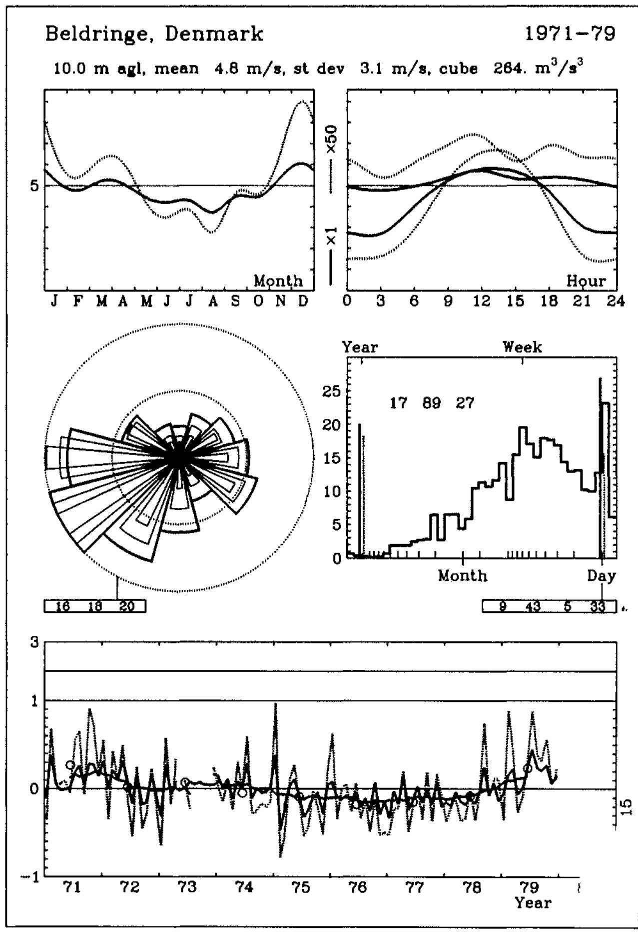
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.2	3.7	4.9	5.1	4.5	3.5	4.3	4.8	5.5	5.2	4.3	4.6
	1.44	1.46	1.58	1.78	1.82	1.81	1.56	1.75	1.92	1.83	1.76	1.79	1.69
25	4.1	3.9	4.6	6.1	6.2	5.6	4.4	5.4	5.9	6.8	6.4	5.3	5.6
	1.54	1.56	1.69	1.89	1.93	1.94	1.67	1.88	2.06	1.91	1.85	1.92	1.79
50	4.8	4.7	5.4	7.1	7.3	6.6	5.2	6.3	7.0	7.8	7.4	6.3	6.6
	1.71	1.73	1.87	2.07	2.10	2.14	1.84	2.08	2.28	2.04	1.98	2.12	1.94
100	5.8	5.6	6.5	8.4	8.6	7.9	6.2	7.6	8.3	9.1	8.6	7.5	7.8
	1.87	1.90	2.05	2.27	2.31	2.35	2.02	2.28	2.50	2.24	2.18	2.33	2.13
200	7.1	6.9	8.0	10.2	10.4	9.7	7.6	9.3	10.3	10.8	10.3	9.2	9.5
	1.79	1.81	1.96	2.18	2.22	2.25	1.94	2.18	2.39	2.16	2.10	2.23	2.07
Freq	4.1	4.5	5.7	10.0	8.5	8.3	8.3	9.4	13.2	14.6	8.3	5.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.5	3.0	3.9	4.0	3.5	2.8	3.5	3.9	4.4	4.0	3.3	3.6
	1.44	1.49	1.60	1.81	1.83	1.78	1.57	1.78	1.92	1.84	1.76	1.78	1.69
25	3.3	3.4	4.0	5.1	5.2	4.6	3.7	4.6	5.1	5.7	5.3	4.4	4.7
	1.52	1.57	1.69	1.90	1.92	1.88	1.67	1.88	2.03	1.90	1.84	1.89	1.78
50	4.1	4.1	4.9	6.2	6.3	5.6	4.5	5.6	6.1	6.8	6.3	5.3	5.7
	1.65	1.71	1.83	2.04	2.06	2.05	1.81	2.05	2.21	2.01	1.95	2.05	1.90
100	4.9	5.0	5.9	7.4	7.5	6.7	5.5	6.7	7.4	8.1	7.6	6.4	6.9
	1.88	1.94	2.09	2.31	2.32	2.33	2.06	2.33	2.51	2.20	2.17	2.34	2.13
200	6.0	6.1	7.2	8.9	9.0	8.2	6.7	8.2	9.0	9.6	9.1	7.8	8.3
	1.81	1.87	2.01	2.24	2.25	2.25	1.98	2.25	2.42	2.19	2.13	2.26	2.09
Freq	4.1	4.7	6.0	10.0	8.4	8.3	8.4	9.9	13.4	14.0	7.8	5.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.7	353	4.7	145	4.1	96	3.2	46
25	7.3	451	5.6	227	5.0	167	4.2	99
50	7.8	542	6.4	313	5.9	242	5.1	160
100	8.5	702	7.6	475	6.9	366	6.1	248
200	9.3	977	9.3	904	8.4	681	7.4	449


Ålborg, Denmark 1965–74
10.0 m agl, mean 5.8 m/s, st dev 3.4 m/s, cube 413. m³/s³
Month
Hour
Year
Week
19 91 26
Month
Day
14 17 22
3 32 3 27
Year


Beldringe, Denmark 1971–79
10.0 m agl, mean 4.8 m/s, st dev 3.1 m/s, cube 264. m³/s³
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Hour
Year
Week
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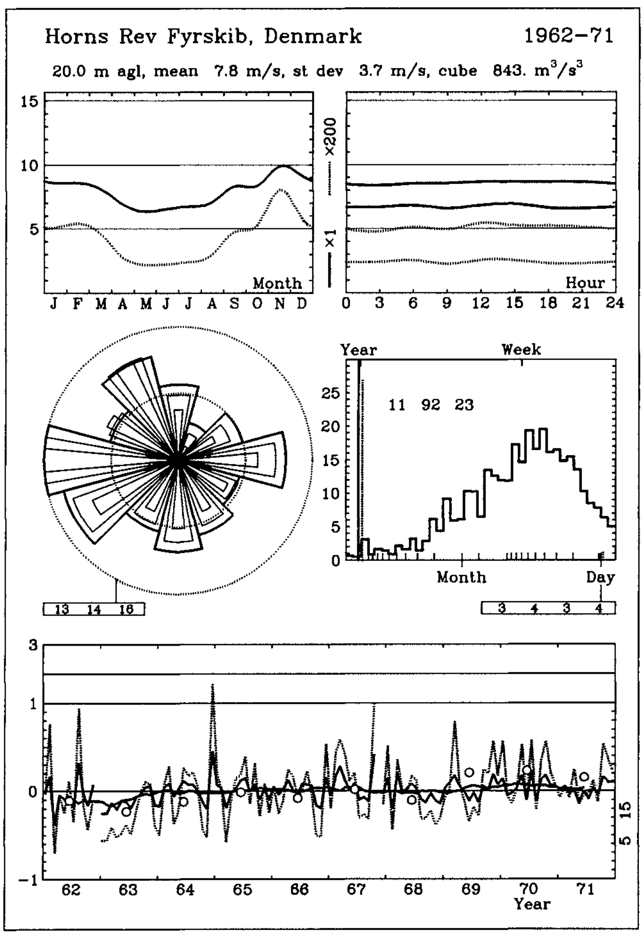
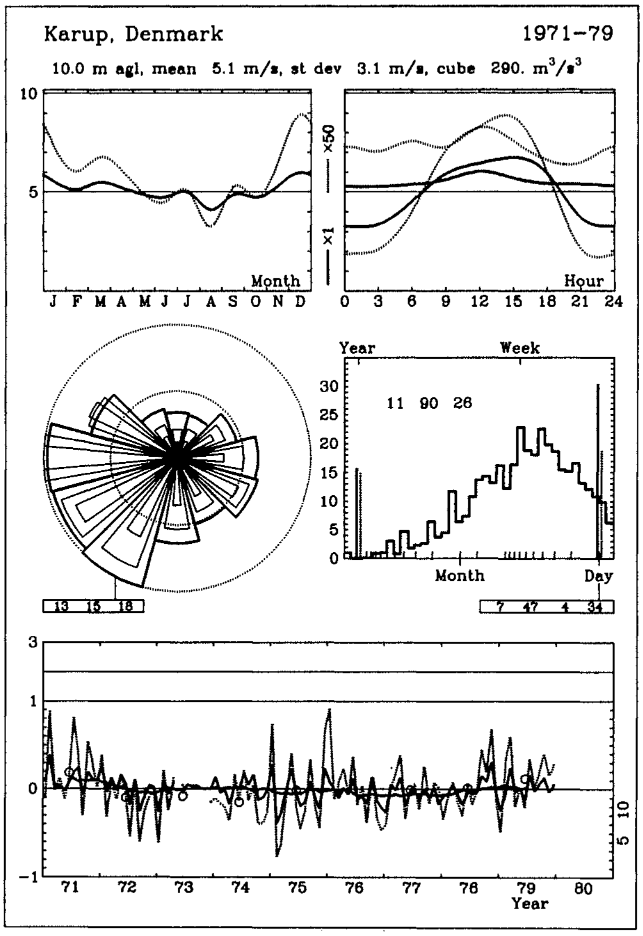
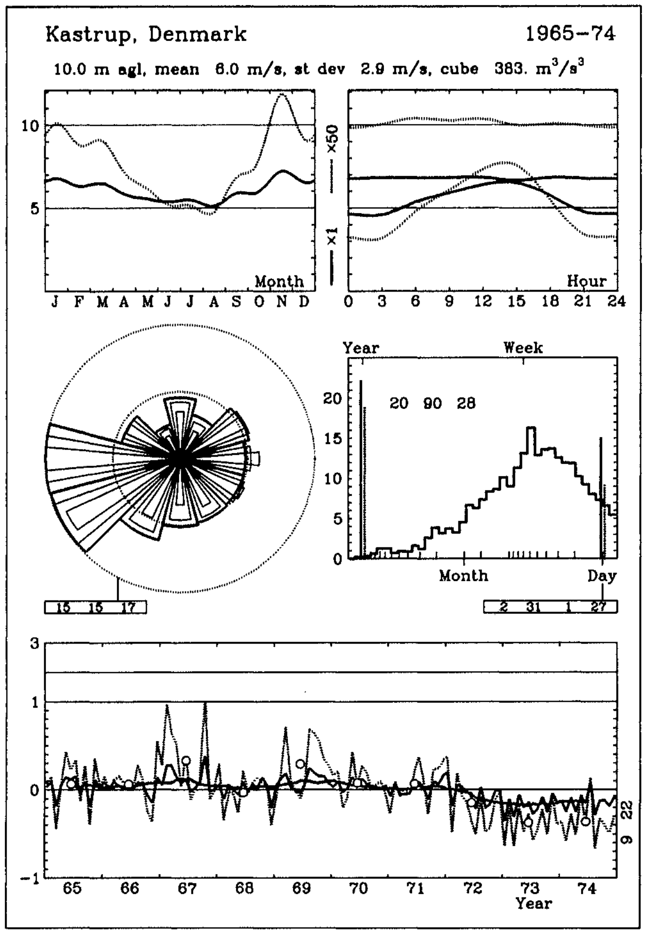
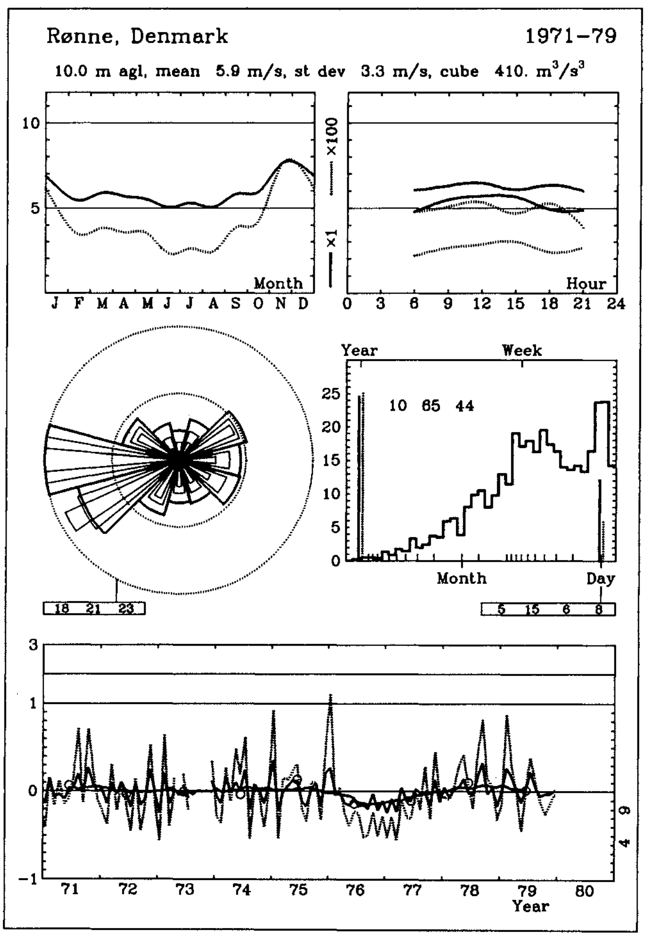
Day
16 18 20
9 43 5 33
Year


Horns Rev Fyrskib, Denmark 1962–71
20.0 m agl, mean 7.8 m/s, st dev 3.7 m/s, cube 843. m³/s³
Month
Hour
Year
Week
11 92 23
Month
Day
13 14 16
3 4 3 4
Year


Karup, Denmark
1971–79
10.0 m agl, mean 5.1 m/s, st dev 3.1 m/s, cube 290. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
11 90 26
Month
Day
13 15 18
7 47 4 34
Year
71 72 73 74 75 76 77 78 79 80
5 10


Kastrup, Denmark
1965–74
10.0 m agl, mean 6.0 m/s, st dev 2.9 m/s, cube 383. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
20 90 28
Month
Day
15 15 17
2 31 1 27
Year
65 66 67 68 69 70 71 72 73 74
9 22


Rønne, Denmark
1971–79
10.0 m agl, mean 5.9 m/s, st dev 3.3 m/s, cube 410. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
10 65 44
Month
Day
18 21 23
5 15 6 8
Year
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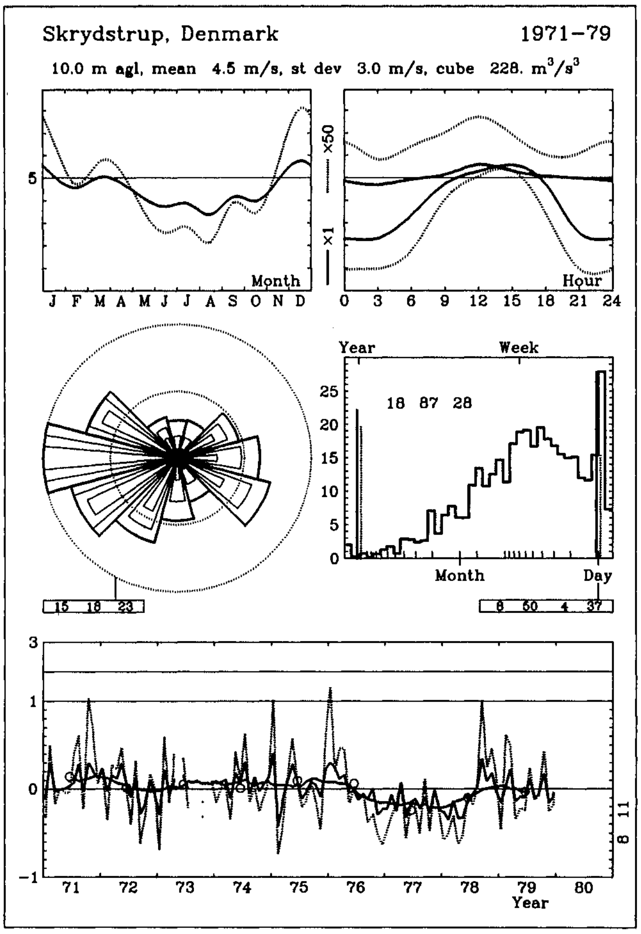
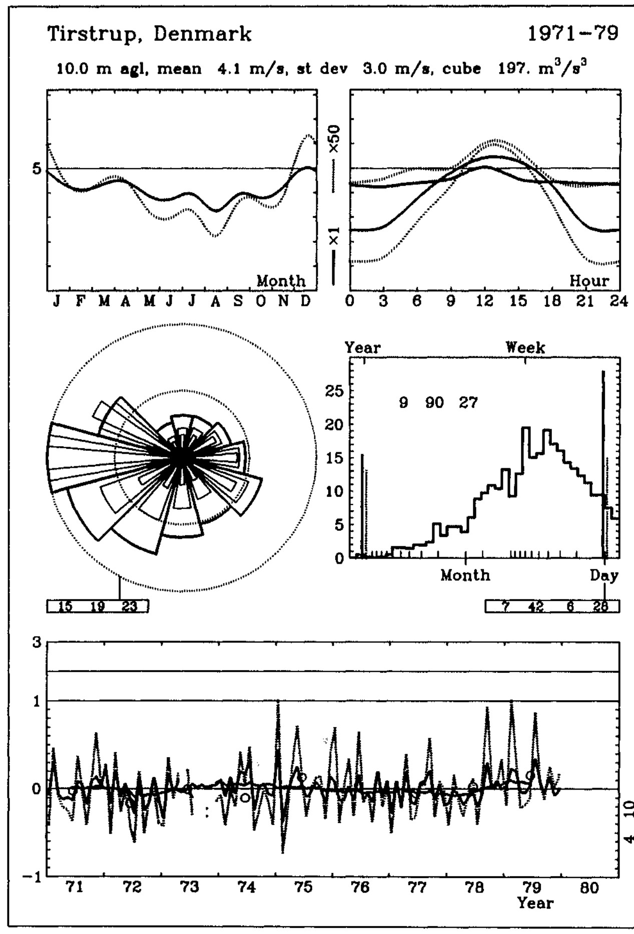
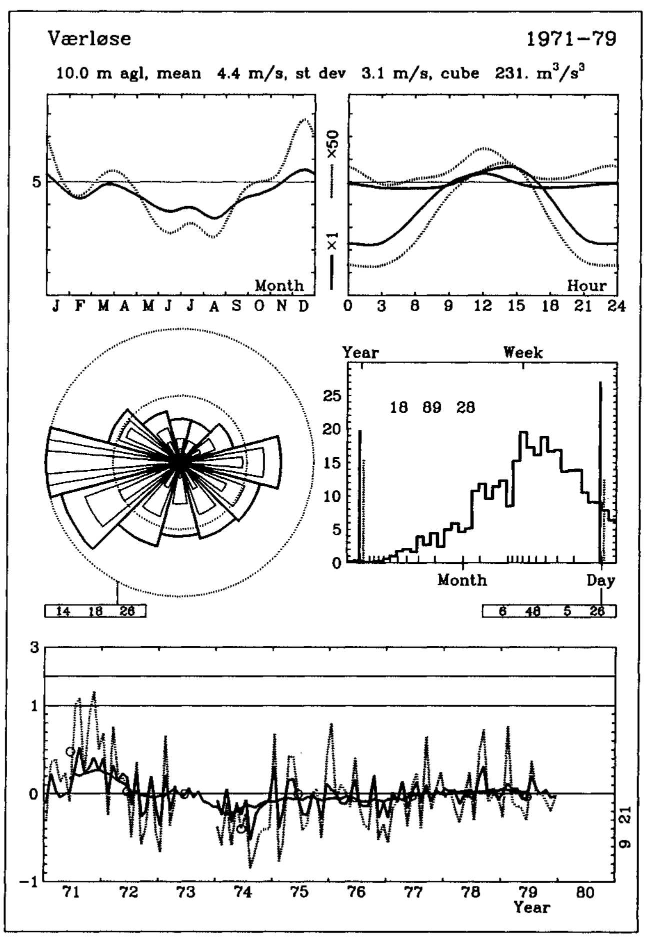

Skrydstrup, Denmark
1971–79
10.0 m agl, mean 4.5 m/s, st dev 3.0 m/s, cube 228. m³/s³
Month
Hour
×50
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
18 87 28
Month
Day
15 18 23
8 50 4 37
8 11
Year


Tirstrup, Denmark
1971–79
10.0 m agl, mean 4.1 m/s, st dev 3.0 m/s, cube 197. m³/s³
Month
Hour
×50
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
9 90 27
Month
Day
15 19 23
7 42 6 28
4 10
Year


Værløse
1971–79
10.0 m agl, mean 4.4 m/s, st dev 3.1 m/s, cube 231. m³/s³
Month
Hour
×50
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
18 89 28
Month
Day
14 18 26
6 48 5 26
9 21
Year

Abbeville

50° 08′ 00″ N 01° 50′ 00″ E	UTM 31 E 416616 m N 5554219 m	77 m a.s.l.

Located in northern France 25 km inland from the Channel coast. The centre of the city of Abbeville is 3 km S of the site. The landscape is relatively open but with many small villages, none of them however, being closer to the site than 2 km. The terrain is rolling. At a distance of approximately 1 to 2 km in the sectors SW through S to E there is a 50-m escarpment delimiting the valley of the river Somme.
The anemometer is situated S of the runways. Except for the meteorological station building 150 m to the E there are no obstacles closer than 500 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	2000	0.10									4	-1
30	0.01	1000	0.10	3000	0.30							4	
60	0.01	1500	0.03	2200	0.40							5	1
90	0.01	1750	0.40									7	1
120	0.01	800	0.05	1700	0.40							8	
150	0.01	800	0.05	1500	0.40							7	-1
180	0.01	1000	0.05	1600	0.50							5	-1
210	0.01	1000	0.05	1800	0.40							4	
240	0.01	1300	0.05	2300	0.30							5	1
270	0.01	500	0.20	800	0.03	2200	0.30					7	1
300	0.01	600	0.30	3000	0.10							7	
330	0.01	1750	0.20									6	-1

Height of anemometer: 11.0 m a.g.l. Period: 70010103-78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.8	101	119	172	167	128	111	71	44	37	32	12	5	2	0	4.6	1.58
30	6.7	61	62	110	161	152	153	117	75	51	45	8	2	1	0	5.6	2.19
60	8.6	61	64	120	187	175	146	103	71	38	27	7	0	0	0	5.2	2.19
90	6.2	94	102	177	193	167	114	77	33	26	15	1	1	0	0	4.4	1.97
120	7.8	74	98	184	201	172	122	68	48	20	11	2	0	0	0	4.4	2.04
150	9.7	64	93	166	206	159	137	79	56	26	10	3	0	0	0	4.6	2.07
180	7.8	70	101	165	186	133	111	85	59	38	35	13	1	0	0	4.8	1.74
210	8.7	58	79	153	183	145	111	83	68	49	50	18	2	0	0	5.1	1.77
240	10.2	50	63	118	145	144	125	98	70	61	70	33	12	6	2	5.9	1.74
270	12.9	42	69	101	107	111	118	111	94	70	95	48	22	8	3	6.8	1.91
300	10.1	57	81	129	136	150	131	107	70	47	56	23	10	3	0	5.6	1.84
330	6.6	87	129	172	175	137	100	74	46	33	34	10	3	0	0	4.5	1.63
Total	100.0	65	85	143	167	147	124	92	64	44	44	17	6	2	1	5.2	1.76

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.2	4.8	4.4	4.1	3.5	3.0	3.2	2.8	3.4	3.8	4.7	4.9	4.0
3	5.1	4.6	4.3	4.1	3.3	3.0	3.2	2.7	3.3	3.9	4.7	4.8	3.9
6	5.1	5.0	4.4	4.2	3.5	3.2	3.2	2.8	3.6	4.0	4.8	4.9	4.1
9	5.2	5.2	5.2	5.7	4.9	4.5	4.5	4.1	4.4	4.5	5.1	5.0	4.9
12	5.9	6.0	6.1	6.4	5.6	5.1	5.4	4.9	5.3	5.3	6.0	5.6	5.6
15	5.8	5.9	6.2	6.6	5.9	5.4	5.7	5.3	5.3	5.1	5.4	5.4	5.7
18	5.3	5.0	4.9	5.7	5.1	5.1	5.1	4.3	4.0	3.8	4.8	5.0	4.8
21	5.3	4.9	4.4	4.4	3.7	3.4	3.4	3.0	3.6	3.8	4.9	5.0	4.2
Day	5.4	5.2	5.0	5.1	4.5	4.1	4.2	3.8	4.1	4.3	5.1	5.1	4.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	7.3	7.3	6.5	6.1	6.4	6.7	7.2	7.9	9.0	8.4	6.9	7.3
	1.88	2.32	2.56	2.41	2.37	2.42	2.17	2.06	2.01	2.06	2.10	2.03	2.03
25	6.6	7.9	8.0	7.1	6.7	6.9	7.3	7.9	8.7	9.8	9.2	7.6	8.0
	1.94	2.39	2.64	2.49	2.44	2.50	2.24	2.13	2.07	2.11	2.15	2.09	2.09
50	7.1	8.5	8.6	7.6	7.1	7.5	7.9	8.5	9.3	10.5	9.9	8.1	8.6
	1.99	2.45	2.71	2.55	2.51	2.56	2.30	2.19	2.12	2.16	2.21	2.15	2.14
100	7.7	9.3	9.3	8.3	7.7	8.1	8.6	9.2	10.0	11.2	10.6	8.8	9.3
	1.93	2.38	2.62	2.47	2.42	2.48	2.23	2.12	2.06	2.12	2.15	2.08	2.09
200	8.5	10.2	10.3	9.1	8.6	9.0	9.4	10.1	11.0	12.2	11.6	9.7	10.2
	1.83	2.25	2.49	2.34	2.30	2.35	2.11	2.01	1.97	2.04	2.06	1.97	2.01
Freq	5.6	6.1	7.9	7.1	7.0	8.8	8.6	8.6	9.9	11.8	10.9	7.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	5.3	5.0	4.3	4.3	4.5	4.7	5.1	5.6	6.5	5.6	4.4	5.1
	1.59	2.09	2.15	1.97	2.01	2.03	1.76	1.75	1.72	1.86	1.80	1.64	1.75
25	5.1	6.3	6.0	5.2	5.1	5.4	5.7	6.1	6.7	7.7	6.7	5.3	6.1
	1.71	2.25	2.32	2.12	2.17	2.19	1.90	1.88	1.82	1.95	1.93	1.77	1.87
50	5.9	7.3	6.9	6.0	5.9	6.2	6.6	7.1	7.7	8.8	7.7	6.2	7.0
	1.92	2.53	2.61	2.39	2.45	2.47	2.13	2.12	2.00	2.09	2.14	1.99	2.06
100	7.0	8.7	8.2	7.1	7.0	7.4	7.8	8.4	9.0	10.1	9.1	7.4	8.3
	2.05	2.70	2.78	2.55	2.60	2.62	2.27	2.26	2.15	2.25	2.29	2.11	2.21
200	8.7	10.8	10.2	8.9	8.8	9.2	9.7	10.4	11.0	11.9	11.2	9.2	10.2
	1.96	2.58	2.65	2.43	2.49	2.51	2.17	2.15	2.06	2.17	2.19	2.02	2.15
Freq	5.2	6.6	8.4	6.5	7.4	9.2	8.2	8.8	10.2	12.4	10.2	7.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	4.7	4.3	3.7	3.8	4.0	4.2	4.4	5.0	5.7	4.8	3.8	4.4
	1.60	2.13	2.15	1.97	2.04	2.10	1.77	1.74	1.73	1.88	1.82	1.65	1.76
25	4.6	5.8	5.4	4.6	4.7	4.9	5.2	5.5	6.1	7.0	5.9	4.7	5.5
	1.71	2.28	2.30	2.11	2.18	2.24	1.89	1.86	1.83	1.96	1.95	1.76	1.87
50	5.4	6.8	6.3	5.4	5.4	5.7	6.1	6.5	7.1	8.1	7.0	5.5	6.4
	1.89	2.53	2.55	2.33	2.42	2.49	2.10	2.06	1.98	2.08	2.15	1.95	2.03
100	6.4	8.1	7.5	6.4	6.5	6.8	7.3	7.7	8.4	9.4	8.3	6.6	7.6
	2.08	2.78	2.80	2.56	2.65	2.73	2.30	2.26	2.18	2.28	2.37	2.14	2.24
200	7.9	9.9	9.2	7.9	8.0	8.4	9.0	9.5	10.1	11.1	10.2	8.1	9.3
	1.99	2.65	2.68	2.45	2.54	2.62	2.20	2.17	2.10	2.20	2.27	2.05	2.18
Freq	5.0	6.8	8.5	6.3	7.5	9.4	8.0	8.9	10.3	12.5	10.0	6.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.7	3.4	2.9	3.0	3.2	3.3	3.5	4.0	4.5	3.7	2.9	3.5
	1.66	2.14	2.13	1.98	2.06	2.07	1.73	1.76	1.76	1.87	1.83	1.67	1.77
25	4.0	4.8	4.4	3.8	3.9	4.1	4.3	4.7	5.2	5.8	4.9	3.9	4.6
	1.76	2.27	2.26	2.10	2.18	2.19	1.83	1.87	1.84	1.94	1.94	1.76	1.86
50	4.8	5.8	5.4	4.6	4.7	5.0	5.3	5.7	6.3	7.0	5.9	4.7	5.6
	1.90	2.47	2.45	2.28	2.37	2.38	1.99	2.03	1.96	2.05	2.11	1.92	2.00
100	5.8	7.0	6.4	5.6	5.7	6.0	6.4	6.8	7.5	8.2	7.1	5.7	6.7
	2.17	2.81	2.79	2.60	2.70	2.71	2.27	2.31	2.19	2.23	2.40	2.18	2.24
200	7.1	8.6	7.9	6.8	7.0	7.3	7.8	8.4	9.0	9.8	8.7	6.9	8.1
	2.09	2.71	2.69	2.50	2.60	2.62	2.19	2.22	2.15	2.22	2.31	2.10	2.21
Freq	5.0	7.0	8.4	6.2	7.7	9.4	8.0	9.1	10.5	12.5	9.6	6.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.5	310	4.5	126	4.0	83	3.1	40
25	7.1	395	5.4	198	4.9	145	4.1	86
50	7.6	476	6.2	274	5.7	212	4.9	140
100	8.2	616	7.3	420	6.8	324	5.9	219
200	9.0	854	9.0	800	8.3	606	7.2	397

Aurillac

44° 53′ 00″ N	02° 25′ 00″ E	UTM 31	E 453929 m	N 4970248 m	639 m a.s.l.

Located in the SW part of the Massif Central, 30 km SW of the twin summits of Puy Mary (1787 m) and Plomb du Cantal (1855 m), at the junction of the river valleys of La Cere and La Jordanne. The centre of the city of Aurillac is 3 km to the NNE of the site. The aerodrome is situated in a relatively flat area, otherwise the terrain in the valley is undulating. The slopes of the river valleys are hilly and partly forested. The anemometer is placed at the NE part of the aerodrome with buildings occurring in the sectors from NW to NE.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	200	0.30										
30	0.01	300	0.10	1250	0.50								
60	0.01	300	0.10	1000	0.30								
90	0.01	400	0.10	2500	0.20								
120	0.01	300	0.10	3000	0.15								
150	0.01	300	0.10	2500	0.35								
180	0.01	750	0.20	2200	0.40								
210	0.01	400	0.20	1600	0.30								
240	0.01	500	0.30										
270	0.01	500	0.20	3000	0.45								
300	0.01	350	0.20										
330	0.01	150	0.20										

Height of anemometer: 11.0 m a.g.l. Period: 79010103-85123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.2	284	178	197	155	112	46	17	5	3	2	0	0	0	0	2.8	1.61
30	2.6	511	126	87	98	77	60	32	4	2	2	0	0	0	0	2.0	1.06
60	3.0	561	273	87	37	24	10	5	3	0	0	0	0	0	0	1.3	1.04
90	12.6	263	358	236	101	31	8	2	1	0	0	0	0	0	0	2.1	1.69
120	19.0	189	286	228	131	69	39	24	13	7	11	2	1	2	0	2.7	1.23
150	6.6	230	146	118	103	100	69	66	45	36	46	25	10	2	4	4.3	1.24
180	4.4	330	148	154	107	79	62	50	20	21	20	4	4	0	1	3.0	1.12
210	4.3	381	213	172	107	77	29	17	2	1	0	0	0	0	0	2.2	1.32
240	5.5	314	197	187	132	80	45	17	15	11	3	0	1	0	0	2.6	1.33
270	7.8	236	199	157	134	103	74	50	23	12	10	3	1	0	0	3.2	1.40
300	16.1	164	217	203	167	108	60	38	20	11	9	1	1	0	0	3.3	1.50
330	12.9	188	216	214	170	110	61	21	12	4	3	0	0	0	0	3.1	1.68
Total	100.0	246	235	193	132	83	47	28	14	9	9	3	1	1	0	2.8	1.25

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.4	2.4	2.3	2.6	1.9	1.7	1.6	1.4	1.8	2.0	2.4	2.6	2.1
3	2.3	2.5	2.3	2.4	2.1	1.6	1.6	1.4	1.9	1.9	2.4	2.4	2.1
6	2.2	2.1	2.2	2.2	1.9	1.5	1.3	1.2	1.8	1.9	2.2	2.4	1.9
9	2.2	2.4	2.8	3.4	3.1	2.5	2.5	2.1	2.2	2.3	2.4	2.3	2.5
12	3.1	3.3	3.8	4.3	3.5	3.4	3.2	3.0	3.2	3.2	3.3	2.9	3.4
15	2.9	3.2	3.8	4.4	3.6	3.5	3.2	3.3	3.3	3.2	3.1	2.8	3.4
18	2.6	2.3	2.6	3.5	2.9	2.8	2.7	2.4	1.9	1.9	2.5	2.3	2.5
21	2.6	2.5	2.3	2.6	1.9	1.6	1.6	1.5	1.8	1.9	2.4	2.6	2.1
Day	2.5	2.6	2.8	3.2	2.6	2.3	2.2	2.0	2.2	2.3	2.6	2.5	2.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.4	2.4	3.1	4.0	4.7	5.6	4.0	4.0	4.9	5.3	5.3	4.6
	1.92	1.63	1.11	1.87	1.42	1.19	1.27	1.37	1.53	1.59	1.76	1.87	1.43
25	5.7	4.9	2.7	3.4	4.4	5.2	6.1	4.4	4.4	5.3	5.8	5.8	5.0
	1.98	1.68	1.15	1.93	1.46	1.21	1.30	1.41	1.58	1.63	1.81	1.93	1.47
50	6.1	5.2	2.9	3.6	4.7	5.6	6.6	4.8	4.7	5.8	6.3	6.3	5.4
	2.03	1.73	1.17	1.98	1.50	1.24	1.33	1.45	1.62	1.68	1.86	1.98	1.51
100	6.6	5.7	3.1	3.9	5.1	6.0	7.1	5.1	5.1	6.2	6.8	6.8	5.8
	1.97	1.67	1.14	1.92	1.45	1.22	1.31	1.40	1.57	1.63	1.80	1.92	1.47
200	7.3	6.2	3.4	4.3	5.6	6.4	7.6	5.6	5.6	6.8	7.5	7.5	6.4
	1.86	1.58	1.08	1.82	1.38	1.17	1.26	1.33	1.49	1.54	1.71	1.81	1.41
Freq	8.6	3.8	2.8	8.2	16.3	12.3	5.3	4.3	5.0	6.8	12.4	14.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	2.7	1.5	2.2	2.9	3.8	3.5	2.5	2.8	3.5	3.7	3.8	3.1
	1.60	1.22	0.99	1.59	1.21	1.09	1.11	1.23	1.31	1.37	1.49	1.62	1.24
25	4.3	3.3	1.9	2.6	3.5	4.6	4.2	3.1	3.4	4.2	4.4	4.5	3.8
	1.72	1.31	1.07	1.71	1.29	1.13	1.18	1.32	1.40	1.47	1.61	1.75	1.32
50	5.0	3.9	2.3	3.0	4.1	5.3	4.9	3.6	4.0	4.9	5.1	5.3	4.4
	1.93	1.47	1.19	1.92	1.45	1.20	1.29	1.48	1.58	1.65	1.80	1.97	1.45
100	5.9	4.6	2.7	3.6	4.9	6.1	5.8	4.3	4.8	5.9	6.1	6.2	5.3
	2.06	1.56	1.26	2.05	1.54	1.28	1.38	1.57	1.67	1.76	1.92	2.10	1.55
200	7.3	5.7	3.3	4.5	6.1	7.1	7.1	5.4	5.9	7.3	7.6	7.8	6.5
	1.96	1.49	1.21	1.96	1.48	1.24	1.32	1.50	1.60	1.68	1.83	2.00	1.51
Freq	6.6	3.1	2.9	10.9	17.9	8.9	4.8	4.3	5.3	7.4	14.6	13.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.2	1.3	1.9	2.6	3.7	2.9	2.1	2.5	3.1	3.2	3.3	2.7
	1.58	1.13	1.00	1.65	1.23	1.15	1.12	1.26	1.31	1.38	1.49	1.62	1.24
25	3.8	2.7	1.6	2.4	3.2	4.6	3.7	2.7	3.1	3.8	4.0	4.1	3.4
	1.69	1.21	1.06	1.77	1.31	1.19	1.19	1.35	1.40	1.48	1.59	1.74	1.31
50	4.5	3.3	1.9	2.8	3.8	5.3	4.4	3.2	3.7	4.5	4.7	4.8	4.1
	1.87	1.33	1.17	1.96	1.44	1.24	1.30	1.49	1.54	1.63	1.76	1.92	1.43
100	5.4	3.9	2.3	3.4	4.6	6.2	5.3	3.8	4.4	5.4	5.6	5.7	4.9
	2.05	1.46	1.28	2.15	1.58	1.35	1.42	1.63	1.69	1.78	1.93	2.11	1.56
200	6.6	4.8	2.9	4.2	5.7	7.2	6.4	4.7	5.5	6.7	6.9	7.1	6.0
	1.96	1.39	1.23	2.06	1.52	1.31	1.37	1.56	1.62	1.71	1.85	2.02	1.53
Freq	5.9	2.9	3.0	11.9	18.5	7.6	4.6	4.3	5.4	7.6	15.4	13.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	1.6	1.1	1.6	2.0	3.3	2.2	1.7	2.0	2.5	2.5	2.6	2.2
	1.58	1.07	1.16	1.60	1.20	1.23	1.12	1.33	1.32	1.40	1.52	1.68	1.26
25	3.2	2.1	1.5	2.2	2.7	4.3	2.9	2.3	2.7	3.3	3.3	3.5	2.9
	1.67	1.13	1.23	1.70	1.27	1.26	1.19	1.41	1.39	1.49	1.61	1.78	1.32
50	3.8	2.6	1.9	2.6	3.3	5.1	3.6	2.8	3.3	4.0	4.1	4.2	3.5
	1.81	1.22	1.33	1.84	1.37	1.31	1.28	1.53	1.51	1.62	1.74	1.93	1.42
100	4.7	3.2	2.3	3.2	4.1	6.0	4.4	3.4	4.0	4.8	4.9	5.1	4.3
	2.06	1.38	1.50	2.10	1.56	1.39	1.45	1.74	1.72	1.83	1.99	2.20	1.58
200	5.7	3.9	2.8	3.8	5.0	7.1	5.4	4.1	4.9	5.9	6.0	6.2	5.2
	1.99	1.33	1.45	2.02	1.51	1.41	1.40	1.68	1.65	1.77	1.91	2.12	1.56
Freq	5.1	2.6	3.7	12.9	18.2	6.5	4.4	4.4	5.6	8.3	15.7	12.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.1	127	2.9	57	2.6	38	2.0	18
25	4.5	160	3.5	87	3.2	64	2.7	38
50	4.9	190	4.0	114	3.7	90	3.2	60
100	5.3	250	4.8	170	4.4	131	3.9	89
200	5.8	357	5.9	332	5.4	250	4.7	163

Avord

47° 03 ′ 00″ N 02° 39 ′ 00″ E	UTM 31 E 473414 m N 5210880 m	179 m a.s.l.

Located in central France between the cities of Nevers and Bourges, 2 km NW of the small city of Avord. The terrain appears rather flat and open with approximately 80% farmland and 20% small forests. The anemometer is placed S of the runway with buildings appearing at distances between 160 m and 300 m in the SE sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1500	0.10										
30	0.01	2000	0.20	4000	0.10								
60	0.01	1500	0.10										
90	0.01	700	0.10										
120	0.01	500	0.10										
150	0.01	400	0.20	2700	0.05								
180	0.01	400	0.30	1750	0.20								
210	0.01	700	0.20	1750	0.10								
240	0.01	1000	0.15	3000	0.05								
270	0.01	2500	0.10										
300	0.01	1500	0.15										
330	0.01	1500	0.15										

Height of anemometer: 12.0 m a.g.l. Period: 72110100–78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.5	110	135	177	171	141	110	64	43	16	25	6	1	0	0	4.3	1.73
30	10.3	69	106	154	160	159	135	100	61	28	22	5	0	0	0	4.9	2.10
60	10.7	81	142	224	205	145	98	48	25	16	14	2	0	0	0	4.0	1.81
90	9.6	109	201	245	220	127	64	19	14	1	1	0	0	0	0	3.3	2.02
120	6.6	130	202	245	221	118	57	14	7	2	4	1	0	0	0	3.2	1.93
150	5.6	161	169	220	197	125	71	29	18	6	3	1	0	0	0	3.4	1.80
180	6.1	117	150	189	173	159	106	52	30	11	12	1	0	0	0	4.0	1.89
210	9.0	87	130	165	165	145	96	84	48	32	33	10	3	0	0	4.6	1.68
240	12.3	71	120	146	140	124	101	77	79	57	60	14	8	1	0	5.2	1.70
270	12.4	73	93	151	148	139	130	88	71	36	43	22	4	1	0	5.2	1.79
300	7.2	109	168	180	172	145	92	52	34	28	13	6	2	1	0	4.1	1.63
330	4.7	156	158	210	161	131	87	46	26	14	10	0	1	0	0	3.6	1.64
Total	100.0	98	142	187	175	138	99	60	42	24	23	7	2	0	0	4.2	1.64

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.6	3.8	3.5	3.4	3.0	3.0	2.6	2.9	3.0	3.0	3.5	4.1	3.3
3	3.7	3.8	3.5	3.3	2.9	2.7	2.5	2.6	2.9	3.0	3.5	4.0	3.2
6	3.7	3.9	3.5	3.3	3.0	3.0	2.6	2.6	2.8	3.1	3.5	4.0	3.3
9	3.9	4.3	4.2	4.2	4.2	3.8	3.8	3.5	3.7	3.5	3.8	4.1	3.9
12	4.6	5.0	5.1	4.8	4.7	4.6	4.3	4.3	4.4	4.1	4.5	4.7	4.6
15	4.3	5.1	5.1	5.1	4.5	4.7	4.5	4.3	4.5	4.0	4.1	4.2	4.5
18	3.8	4.0	4.1	4.2	3.8	4.2	4.2	4.0	3.4	2.8	3.7	3.9	3.8
21	3.7	4.1	3.7	3.4	2.9	3.0	2.7	2.9	2.9	2.9	3.6	3.9	3.3
Day	3.9	4.3	4.1	4.0	3.6	3.6	3.4	3.4	3.5	3.3	3.8	4.1	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	6.5	5.8	4.9	4.7	4.9	5.8	6.6	7.1	7.1	6.2	5.3	6.0
	1.98	2.37	2.16	2.23	2.27	2.12	2.11	2.02	1.99	2.06	1.95	1.90	1.96
25	6.2	7.1	6.3	5.4	5.1	5.3	6.4	7.2	7.8	7.8	6.8	5.8	6.6
	2.05	2.45	2.23	2.30	2.34	2.19	2.18	2.09	2.05	2.13	2.01	1.96	2.01
50	6.6	7.6	6.8	5.8	5.5	5.7	6.8	7.7	8.4	8.3	7.3	6.2	7.1
	2.10	2.51	2.29	2.36	2.40	2.25	2.24	2.14	2.10	2.18	2.06	2.01	2.06
100	7.2	8.3	7.3	6.3	5.9	6.2	7.4	8.4	9.1	9.0	7.9	6.7	7.6
	2.03	2.43	2.22	2.28	2.33	2.18	2.16	2.07	2.03	2.11	1.99	1.95	2.00
200	7.9	9.1	8.1	6.9	6.6	6.9	8.2	9.2	10.0	10.0	8.7	7.4	8.4
	1.92	2.30	2.10	2.16	2.20	2.06	2.05	1.96	1.93	2.00	1.89	1.85	1.90
Freq	5.3	8.7	10.5	9.9	7.6	5.9	6.0	8.1	11.3	12.4	8.8	5.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.6	3.8	3.3	3.3	3.5	4.3	4.6	5.0	4.9	4.0	3.6	4.2
	1.70	2.04	1.79	1.95	1.90	1.77	1.83	1.67	1.68	1.76	1.61	1.61	1.67
25	4.9	5.5	4.6	4.0	3.9	4.2	5.1	5.5	6.0	5.9	4.9	4.3	5.0
	1.83	2.20	1.94	2.11	2.05	1.91	1.97	1.80	1.81	1.89	1.74	1.74	1.79
50	5.7	6.4	5.3	4.6	4.5	4.8	5.9	6.3	7.0	6.8	5.7	5.0	5.8
	2.06	2.47	2.18	2.37	2.31	2.14	2.21	2.02	2.03	2.13	1.95	1.95	2.00
100	6.7	7.6	6.3	5.5	5.4	5.8	7.0	7.5	8.3	8.1	6.7	5.9	6.9
	2.19	2.63	2.32	2.53	2.46	2.28	2.36	2.15	2.17	2.27	2.08	2.08	2.12
200	8.3	9.4	7.9	6.8	6.7	7.2	8.8	9.4	10.3	10.1	8.4	7.3	8.6
	2.09	2.52	2.21	2.41	2.35	2.18	2.25	2.05	2.07	2.17	1.98	1.98	2.03
Freq	5.4	9.9	10.6	9.6	6.8	5.7	6.1	8.8	12.1	12.4	7.6	4.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	4.0	3.3	2.9	2.9	3.1	3.8	4.0	4.4	4.3	3.4	3.1	3.6
	1.72	2.05	1.78	1.98	1.88	1.77	1.84	1.67	1.68	1.76	1.60	1.64	1.68
25	4.4	5.0	4.1	3.6	3.6	3.8	4.7	5.0	5.4	5.3	4.3	3.9	4.5
	1.84	2.19	1.90	2.12	2.01	1.90	1.97	1.79	1.79	1.88	1.71	1.76	1.79
50	5.2	5.8	4.8	4.2	4.2	4.5	5.5	5.8	6.4	6.2	5.0	4.5	5.3
	2.04	2.42	2.11	2.35	2.23	2.10	2.18	1.98	1.99	2.08	1.90	1.94	1.96
100	6.2	6.9	5.7	5.0	5.0	5.4	6.6	7.0	7.6	7.4	6.0	5.4	6.3
	2.24	2.67	2.31	2.58	2.45	2.31	2.39	2.17	2.18	2.29	2.08	2.13	2.14
200	7.7	8.5	7.1	6.2	6.2	6.6	8.1	8.6	9.4	9.1	7.4	6.7	7.8
	2.14	2.55	2.22	2.47	2.34	2.21	2.29	2.08	2.09	2.19	1.99	2.05	2.05
Freq	5.6	10.3	10.6	9.5	6.6	5.6	6.2	9.1	12.3	12.3	7.2	4.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.1	2.6	2.3	2.3	2.5	3.0	3.2	3.4	3.3	2.7	2.5	2.9
	1.79	1.99	1.82	1.94	1.84	1.77	1.81	1.66	1.70	1.74	1.62	1.65	1.68
25	3.8	4.1	3.4	3.0	3.0	3.3	4.0	4.2	4.5	4.4	3.6	3.3	3.8
	1.90	2.10	1.93	2.06	1.95	1.88	1.92	1.76	1.80	1.85	1.72	1.74	1.78
50	4.6	4.9	4.1	3.6	3.6	4.0	4.8	5.1	5.5	5.3	4.3	4.0	4.6
	2.06	2.29	2.10	2.24	2.12	2.05	2.08	1.91	1.95	2.01	1.87	1.89	1.92
100	5.6	5.9	5.0	4.3	4.4	4.8	5.8	6.2	6.6	6.4	5.3	4.8	5.6
	2.35	2.61	2.39	2.55	2.42	2.33	2.37	2.18	2.22	2.29	2.13	2.15	2.16
200	6.8	7.2	6.1	5.3	5.3	5.9	7.1	7.5	8.1	7.8	6.4	5.9	6.8
	2.26	2.51	2.30	2.45	2.33	2.24	2.28	2.10	2.14	2.20	2.05	2.08	2.09
Freq	6.2	10.4	10.5	9.1	6.4	5.6	6.6	9.5	12.3	11.6	6.8	4.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.3	178	3.7	74	3.3	49	2.6	23
25	5.8	228	4.5	116	4.0	85	3.4	51
50	6.2	276	5.2	160	4.7	124	4.1	82
100	6.8	362	6.1	254	5.6	194	4.9	129
200	7.5	515	7.6	508	6.9	379	6.0	242

Bordeaux

44° 50′ 00″ N	00° 42′ 00″ E	UTM 31	E 318191 m	N 4967101 m	51 m a.s.l.

The station is situated 10 km W of the city centre. The suburbs extend to within 2.5 km of the site. The terrain is rather flat and, except for the city, densely forested - the forest extending to the borders of the airport. The anemometer is placed N of the runways with buildings appearing in the W and S sectors at distances between 150 and 200 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.07	750	0.50										
30	0.15	500	0.40										
60	0.15	750	0.40										
90	0.10	750	0.40									-5	
120	0.07	500	0.40									-11	
150	0.10	400	0.35	3000	0.60							-6	
180	0.03	300	0.40	850	0.05	1500	0.40	2500	0.60			-10	
210	0.05	600	0.30	1000	0.01	2000	0.60						
240	0.05	200	0.01	2300	0.40	3100	0.60						
270	0.03	200	0.01	1100	0.40	3500	0.60						
300	0.01	900	0.40	3500	0.60								
330	0.01	500	0.40										

Height of anemometer: 11.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.1	124	188	251	197	130	59	32	13	4	1	1	0	0	0	3.3	1.85
30	10.0	109	201	233	204	126	68	37	12	5	4	2	0	0	0	3.4	1.80
60	8.0	150	241	270	172	95	41	22	8	2	0	0	0	0	0	2.9	1.79
90	5.1	221	249	259	153	82	23	8	3	1	1	0	0	0	0	2.6	1.77
120	6.8	126	204	260	202	121	58	20	7	1	2	0	0	0	0	3.2	1.95
150	8.5	140	176	258	195	122	65	29	11	2	1	0	0	0	0	3.3	1.89
180	5.4	184	216	210	194	102	47	30	10	2	4	0	0	0	0	3.1	1.71
210	7.1	139	181	241	194	122	57	35	17	7	5	1	1	0	0	3.4	1.69
240	10.5	100	149	212	188	114	92	54	37	21	23	7	3	0	0	4.0	1.52
270	12.7	89	126	166	158	134	103	75	58	41	33	8	5	2	1	4.7	1.61
300	10.2	111	126	178	141	133	102	80	58	37	24	6	3	1	0	4.5	1.69
330	7.7	138	171	218	180	111	87	47	25	11	12	0	0	0	0	3.6	1.66
Total	100.0	128	178	225	181	119	72	43	25	14	11	3	1	0	0	3.6	1.55

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.0	3.2	2.7	2.7	2.3	2.3	2.2	2.2	1.9	2.2	2.7	2.8	2.5
3	2.9	3.1	2.6	2.6	2.3	1.9	1.9	1.8	1.8	2.1	2.6	2.7	2.4
6	2.9	3.2	2.5	2.6	2.4	2.1	1.9	1.8	1.8	2.0	2.6	2.8	2.4
9	3.3	3.6	3.6	3.9	3.5	3.2	3.1	3.1	3.0	2.9	3.0	2.9	3.3
12	4.1	4.9	4.8	4.7	4.4	3.9	3.8	3.8	3.7	3.8	3.9	3.7	4.1
15	4.2	4.9	5.2	5.3	4.7	4.5	4.4	4.3	4.0	3.8	3.9	3.5	4.4
18	3.2	3.5	3.9	4.4	4.1	4.4	4.4	4.0	3.0	2.6	2.7	3.1	3.6
21	2.9	3.2	3.0	3.1	2.7	2.8	2.9	2.5	2.4	2.3	2.7	3.0	2.8
Day	3.3	3.7	3.5	3.6	3.3	3.1	3.1	3.0	2.7	2.7	3.0	3.1	3.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.2	5.8	5.1	5.7	6.4	6.2	5.8	5.8	6.7	7.1	6.3	6.1
	2.08	2.10	2.05	2.06	2.11	2.26	2.12	2.00	1.83	1.81	1.94	1.92	1.94
25	6.3	6.7	6.4	5.6	6.2	7.0	6.8	6.3	6.4	7.4	7.8	6.9	6.7
	2.15	2.17	2.12	2.13	2.17	2.33	2.18	2.06	1.89	1.87	2.00	1.98	2.00
50	6.8	7.2	6.8	6.0	6.7	7.5	7.3	6.8	6.8	7.9	8.4	7.4	7.2
	2.20	2.22	2.17	2.19	2.23	2.39	2.24	2.12	1.94	1.92	2.06	2.03	2.05
100	7.4	7.8	7.4	6.5	7.3	8.1	7.9	7.3	7.4	8.6	9.1	8.1	7.8
	2.13	2.15	2.10	2.12	2.16	2.31	2.17	2.05	1.88	1.86	1.99	1.97	1.99
200	8.1	8.7	8.2	7.2	8.0	9.0	8.7	8.1	8.2	9.5	10.0	8.9	8.7
	2.02	2.04	1.99	2.01	2.05	2.19	2.05	1.94	1.78	1.76	1.88	1.86	1.88
Freq	7.8	9.1	8.9	6.5	6.0	7.7	6.9	6.3	9.0	11.7	11.3	8.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.4	3.9	3.5	4.2	4.4	4.2	3.9	4.0	4.8	4.9	4.2	4.3
	1.81	1.78	1.75	1.73	1.84	1.85	1.73	1.69	1.52	1.56	1.65	1.62	1.64
25	4.9	5.3	4.7	4.2	5.1	5.3	5.1	4.7	4.9	5.8	5.9	5.0	5.1
	1.96	1.92	1.88	1.86	1.99	2.00	1.86	1.82	1.64	1.69	1.77	1.74	1.77
50	5.6	6.1	5.4	4.8	5.8	6.2	5.9	5.5	5.7	6.8	6.8	5.8	6.0
	2.20	2.16	2.12	2.09	2.24	2.25	2.09	2.04	1.84	1.89	1.99	1.96	1.98
100	6.7	7.2	6.4	5.7	6.9	7.3	7.0	6.5	6.7	8.1	8.1	6.9	7.1
	2.34	2.30	2.26	2.22	2.38	2.40	2.22	2.17	1.96	2.01	2.12	2.08	2.10
200	8.3	9.0	8.0	7.1	8.6	9.1	8.7	8.1	8.4	10.0	10.1	8.6	8.8
	2.23	2.19	2.15	2.13	2.27	2.29	2.13	2.08	1.87	1.92	2.03	1.99	2.01
Freq	7.9	9.5	8.4	5.7	6.4	8.1	6.1	6.8	9.9	12.2	10.7	8.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.8	3.3	3.0	3.8	3.9	3.7	3.4	3.5	4.3	4.3	3.6	3.7
	1.79	1.78	1.72	1.71	1.90	1.90	1.72	1.67	1.53	1.58	1.65	1.62	1.65
25	4.4	4.8	4.1	3.7	4.6	4.8	4.6	4.2	4.4	5.3	5.3	4.4	4.6
	1.92	1.91	1.84	1.83	2.03	2.04	1.84	1.78	1.64	1.69	1.77	1.73	1.76
50	5.1	5.6	4.8	4.3	5.4	5.7	5.4	4.9	5.2	6.3	6.2	5.2	5.4
	2.13	2.11	2.03	2.03	2.24	2.26	2.03	1.97	1.81	1.87	1.96	1.92	1.94
100	6.1	6.7	5.8	5.2	6.5	6.8	6.4	5.9	6.2	7.5	7.4	6.2	6.5
	2.34	2.32	2.23	2.22	2.47	2.48	2.23	2.17	1.99	2.05	2.15	2.10	2.12
200	7.6	8.2	7.1	6.4	8.0	8.4	7.9	7.3	7.7	9.2	9.1	7.7	8.0
	2.24	2.22	2.14	2.13	2.36	2.37	2.14	2.07	1.90	1.96	2.06	2.01	2.03
Freq	8.0	9.7	8.3	5.5	6.6	8.3	5.8	7.0	10.2	12.4	10.4	7.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.1	2.6	2.3	3.0	3.1	2.9	2.7	2.8	3.4	3.3	2.8	2.9
	1.88	1.79	1.79	1.70	1.93	1.88	1.68	1.70	1.55	1.60	1.66	1.66	1.66
25	3.7	4.0	3.4	3.1	4.0	4.1	3.8	3.5	3.8	4.5	4.4	3.7	3.9
	1.99	1.90	1.89	1.80	2.04	1.99	1.78	1.80	1.64	1.69	1.76	1.76	1.76
50	4.5	4.9	4.1	3.7	4.8	4.9	4.6	4.3	4.6	5.5	5.3	4.4	4.7
	2.16	2.06	2.06	1.96	2.22	2.16	1.93	1.96	1.78	1.83	1.91	1.91	1.90
100	5.4	5.9	5.0	4.5	5.8	5.9	5.5	5.2	5.5	6.6	6.4	5.3	5.7
	2.46	2.35	2.34	2.23	2.53	2.46	2.20	2.23	2.03	2.08	2.18	2.18	2.15
200	6.6	7.2	6.1	5.5	7.1	7.2	6.8	6.3	6.8	8.1	7.9	6.5	7.0
	2.37	2.26	2.26	2.15	2.44	2.37	2.12	2.15	1.96	2.01	2.10	2.10	2.08
Freq	8.1	10.0	8.0	5.1	6.7	8.5	5.5	7.3	10.5	12.6	10.1	7.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.5	195	3.8	81	3.3	54	2.6	26
25	6.0	249	4.6	127	4.1	94	3.5	56
50	6.4	301	5.3	174	4.8	135	4.2	90
100	7.0	396	6.3	276	5.8	211	5.1	140
200	7.7	564	7.8	554	7.1	411	6.2	264

Brest

48° 27′ 00″ N	04° 25′ 00″ W	UTM 30	E 395241 m	N 5367393 m	103 m a.s.l.

Located in the western part of Brittany, 7 km NE of the city of Brest and 5 km N of the Rade de Brest inlet. The landscape is gently rolling and characterized by many shelterbelts with an average distance of about 100 m and by scattered small villages. The anemometer is placed south of the runways with the airport buildings appearing 300 m away in the ENE sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.30										
30	0.01	1100	0.30										
60	0.01	300	0.10	1500	0.30								
90	0.03	500	0.30										
120	0.03	250	0.35										
150	0.03	250	0.35										
180	0.03	250	0.30										
210	0.03	250	0.30										
240	0.03	250	0.30										
270	0.03	250	0.10	1250	0.30								
300	0.01	600	0.30										
330	0.01	500	0.30										

Height of anemometer: 10.5 m a.g.l. Period: 70010100–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.2	55	97	160	170	156	131	85	55	38	38	11	4	0	0	5.0	1.85
30	9.5	43	73	146	173	150	129	91	74	47	56	15	2	0	0	5.4	1.91
60	9.4	38	76	135	170	137	117	110	85	57	55	16	4	0	0	5.6	1.96
90	4.9	82	108	206	172	145	115	77	45	25	25	1	0	0	0	4.4	1.86
120	3.3	84	151	212	187	157	99	63	27	16	2	1	0	0	0	4.0	1.97
150	7.0	56	138	217	184	153	104	69	39	22	15	3	0	0	0	4.2	1.84
180	8.3	53	109	189	170	136	108	87	52	36	40	16	2	0	0	4.8	1.71
210	10.4	38	72	128	143	146	134	96	88	64	63	22	4	2	0	5.8	1.97
240	11.4	37	74	153	148	152	118	93	89	58	53	15	6	0	1	5.5	1.89
270	9.9	52	108	156	156	136	118	91	67	50	48	15	4	1	0	5.2	1.79
300	9.1	50	103	148	161	153	113	86	69	48	43	15	7	2	2	5.2	1.70
330	8.8	50	99	157	151	147	121	94	75	40	43	17	2	2	1	5.2	1.82
Total	100.0	50	96	161	163	147	119	90	68	45	44	14	3	1	0	5.2	1.82

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.5	4.0	3.9	3.5	3.1	3.0	3.2	3.3	3.7	4.2	4.7	3.8
3	4.6	4.5	4.0	3.9	3.5	3.0	3.0	3.1	3.3	3.6	4.1	4.7	3.8
6	4.7	4.6	4.1	4.1	3.6	3.3	3.2	3.1	3.3	3.7	4.3	4.8	3.9
9	4.8	4.6	4.9	5.9	5.2	4.7	4.6	4.5	4.5	4.4	4.4	4.8	4.8
12	5.8	6.1	6.2	6.5	6.0	5.3	5.1	5.2	5.4	5.4	5.6	5.6	5.7
15	5.7	6.0	6.4	6.8	6.2	5.9	5.7	5.7	5.5	5.3	5.3	5.5	5.8
18	4.8	4.7	5.0	5.9	5.6	5.5	5.3	5.0	4.4	3.8	4.3	4.9	4.9
21	4.8	4.7	4.3	4.1	3.7	3.3	3.4	3.3	3.4	3.7	4.4	4.9	4.0
Day	5.0	4.9	4.9	5.1	4.7	4.2	4.2	4.1	4.1	4.2	4.6	5.0	4.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	7.8	8.5	8.1	7.1	7.6	8.1	9.5	9.8	9.1	8.3	8.1	8.5
	2.15	2.22	2.20	2.19	2.23	2.21	1.97	2.06	2.14	2.06	1.96	2.03	2.05
25	8.6	8.6	9.3	8.9	7.8	8.3	8.9	10.3	10.7	9.9	9.0	8.9	9.3
	2.22	2.30	2.26	2.25	2.30	2.28	2.01	2.10	2.17	2.10	2.01	2.08	2.10
50	9.2	9.2	10.0	9.6	8.4	8.9	9.5	11.0	11.4	10.6	9.6	9.5	9.9
	2.28	2.36	2.32	2.31	2.36	2.34	2.07	2.15	2.23	2.16	2.06	2.14	2.15
100	10.0	10.0	10.8	10.4	9.1	9.7	10.3	11.8	12.2	11.4	10.4	10.3	10.7
	2.20	2.28	2.26	2.25	2.28	2.27	2.02	2.12	2.19	2.12	2.02	2.09	2.11
200	11.0	11.0	11.8	11.4	10.1	10.7	11.2	12.8	13.2	12.3	11.3	11.3	11.7
	2.08	2.16	2.16	2.13	2.16	2.15	1.93	2.05	2.13	2.04	1.94	1.99	2.03
Freq	8.4	9.0	9.4	6.7	4.0	5.4	7.8	9.6	10.9	10.5	9.5	8.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	5.5	6.2	5.4	5.0	5.3	5.8	7.0	6.9	6.2	5.7	5.7	5.9
	1.81	1.87	1.92	1.84	1.90	1.83	1.69	1.91	1.88	1.79	1.70	1.78	1.78
25	6.4	6.6	7.3	6.4	6.0	6.4	6.9	8.2	8.1	7.4	6.8	6.8	7.1
	1.96	2.02	2.05	1.99	2.05	1.97	1.77	1.99	1.96	1.88	1.80	1.90	1.88
50	7.4	7.7	8.4	7.5	6.9	7.4	7.9	9.3	9.2	8.4	7.8	7.9	8.1
	2.20	2.27	2.24	2.23	2.31	2.22	1.93	2.11	2.09	2.03	1.96	2.09	2.06
100	8.8	9.1	9.8	8.9	8.2	8.7	9.2	10.6	10.5	9.7	9.1	9.2	9.4
	2.34	2.42	2.40	2.38	2.45	2.36	2.07	2.27	2.24	2.18	2.10	2.24	2.22
200	10.9	11.3	11.8	11.0	10.2	10.9	11.0	12.4	12.3	11.6	10.9	11.2	11.4
	2.24	2.31	2.31	2.27	2.35	2.25	1.99	2.20	2.17	2.10	2.03	2.15	2.16
Freq	8.3	9.3	9.4	5.6	3.6	6.3	8.1	10.1	11.2	10.2	9.3	8.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.8	5.4	4.5	4.3	4.6	5.1	6.2	6.0	5.4	5.0	5.0	5.2
	1.82	1.90	1.94	1.83	1.91	1.83	1.71	1.94	1.90	1.78	1.71	1.79	1.79
25	5.7	6.0	6.7	5.6	5.4	5.7	6.3	7.5	7.3	6.6	6.1	6.2	6.4
	1.95	2.04	2.05	1.96	2.05	1.96	1.78	2.01	1.97	1.86	1.80	1.90	1.88
50	6.7	7.0	7.7	6.6	6.3	6.7	7.3	8.6	8.4	7.6	7.1	7.2	7.4
	2.16	2.26	2.21	2.17	2.27	2.16	1.91	2.12	2.08	1.99	1.95	2.06	2.03
100	7.9	8.4	9.1	7.8	7.5	8.0	8.5	9.9	9.7	8.9	8.3	8.5	8.7
	2.37	2.48	2.43	2.38	2.49	2.38	2.10	2.31	2.28	2.19	2.14	2.27	2.24
200	9.8	10.3	10.9	9.7	9.2	9.9	10.2	11.6	11.4	10.6	10.0	10.3	10.5
	2.27	2.37	2.34	2.28	2.38	2.27	2.03	2.25	2.21	2.11	2.06	2.18	2.18
Freq	8.3	9.4	9.3	5.2	3.4	6.6	8.2	10.2	11.3	10.1	9.2	8.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.8	4.3	3.5	3.4	3.7	4.1	4.9	4.7	4.2	3.9	3.9	4.1
	1.85	1.92	1.96	1.85	1.92	1.83	1.73	1.97	1.89	1.78	1.73	1.82	1.81
25	4.8	5.1	5.6	4.6	4.5	4.8	5.4	6.4	6.1	5.4	5.1	5.2	5.4
	1.96	2.03	2.05	1.96	2.04	1.94	1.80	2.03	1.95	1.85	1.81	1.92	1.88
50	5.8	6.1	6.7	5.5	5.4	5.8	6.4	7.6	7.2	6.5	6.1	6.2	6.4
	2.13	2.20	2.19	2.13	2.22	2.11	1.90	2.12	2.05	1.96	1.94	2.06	2.01
100	6.9	7.4	8.0	6.7	6.6	7.1	7.6	8.9	8.5	7.7	7.3	7.5	7.7
	2.43	2.51	2.44	2.42	2.53	2.40	2.09	2.29	2.21	2.16	2.17	2.32	2.23
200	8.5	9.0	9.6	8.2	8.0	8.6	9.1	10.4	10.0	9.2	8.8	9.0	9.2
	2.34	2.42	2.39	2.33	2.43	2.32	2.07	2.30	2.22	2.14	2.12	2.25	2.21
Freq	8.3	9.4	9.2	4.8	3.4	7.0	8.4	10.4	11.4	9.9	9.1	8.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.5	483	5.3	196	4.6	129	3.6	62
25	8.2	616	6.3	308	5.7	225	4.8	133
50	8.8	737	7.2	421	6.6	326	5.7	215
100	9.5	940	8.4	621	7.7	482	6.8	331
200	10.3	1275	10.1	1124	9.3	859	8.2	577

Caen

49° 11′ 00″ N	00° 27′ 00″ E	UTM 31	E 314172 m	N 5451075 m	67 m a.s.l.

Location 20 km inland from the northern coast of Normandy and 6-7 km from the centre of the city of Caen. The city extends to 3 km from the airport in the NE to SE sectors. In the N sector a small village extends from 750 to 1500 m. The terrain is characterized by open fields, but with many small villages. At a distance of 2.5 km to the S there is a 30-m escarpment down to a river valley running E-W. The anemometer is placed between runways with no obstacles closer than 700 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.20	1700	0.05								
30	0.01	500	0.20	2000	0.07								
60	0.01	500	0.05	1750	0.20								
90	0.01	700	0.10	3000	0.40								
120	0.01	700	0.30	1250	0.15								
150	0.01	1200	0.05	2000	0.07								
180	0.01	1000	0.05	2000	0.20								
210	0.01	1000	0.05	2500	0.30								
240	0.01	1250	0.07										
270	0.01	1500	0.15										
300	0.01	1000	0.07										
330	0.01	750	0.10	3000	0.20								

Height of anemometer: 12.1 m a.g.l. Period: 72062200–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.7	50	88	140	165	169	152	94	66	28	32	9	4	2	1	5.2	1.97
30	8.6	47	59	126	133	178	141	112	85	49	52	17	1	1	1	5.6	2.04
60	4.8	68	107	175	186	185	115	78	44	29	13	2	0	0	0	4.5	2.09
90	4.0	111	116	192	191	172	102	56	36	11	8	3	1	0	0	4.1	1.94
120	6.6	56	105	213	244	175	101	56	23	15	10	2	0	0	0	4.2	2.04
150	6.7	66	142	208	204	147	93	57	35	21	21	4	1	0	0	4.1	1.72
180	8.3	52	79	147	160	137	122	98	68	44	52	27	8	3	2	5.5	1.69
210	11.2	42	49	121	151	154	129	96	75	49	80	32	16	4	1	6.0	1.75
240	12.5	30	39	98	153	169	145	107	71	63	67	39	10	5	2	6.1	1.81
270	14.4	27	40	85	157	178	163	113	85	51	63	22	11	4	1	6.0	1.95
300	8.7	56	97	178	185	134	97	77	57	46	44	18	7	3	1	4.9	1.55
330	6.4	87	113	192	173	131	110	76	44	34	29	7	2	0	3	4.5	1.56
Total	100.0	51	76	144	170	161	128	90	63	41	46	19	7	2	1	5.3	1.74

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.4	4.7	4.6	4.1	3.8	3.1	3.1	3.0	3.6	3.7	4.9	5.6	4.1
3	5.6	4.8	4.7	4.1	3.9	3.1	3.1	2.8	3.6	3.8	5.0	5.5	4.2
6	5.7	4.8	4.7	4.2	4.0	3.2	3.1	2.7	3.6	3.8	4.9	5.3	4.1
9	5.6	5.1	5.4	5.5	5.3	4.3	4.2	4.1	4.7	4.3	5.0	5.3	4.9
12	6.5	6.1	6.5	6.2	6.0	5.2	5.0	4.9	5.4	5.1	6.1	6.3	5.7
15	6.3	6.0	6.6	6.8	6.3	5.7	5.7	5.5	5.6	4.9	5.6	5.8	5.9
18	5.4	4.9	5.2	5.5	5.2	5.0	4.8	4.6	4.2	3.8	4.9	5.3	4.9
21	5.7	5.0	4.8	4.2	3.7	3.1	2.9	2.8	3.6	3.9	4.9	5.6	4.1
Day	5.8	5.2	5.3	5.1	4.8	4.1	4.0	3.8	4.3	4.2	5.2	5.6	4.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	8.0	7.3	6.3	6.0	5.8	7.1	8.3	8.3	8.3	7.6	6.6	7.5
	2.16	2.38	2.36	2.32	2.35	2.13	1.86	1.97	2.05	2.22	2.07	1.83	2.02
25	7.9	8.8	8.0	6.9	6.6	6.3	7.8	9.0	9.1	9.1	8.3	7.3	8.2
	2.23	2.45	2.44	2.39	2.42	2.20	1.92	2.01	2.10	2.28	2.14	1.89	2.08
50	8.5	9.4	8.6	7.4	7.1	6.8	8.4	9.7	9.7	9.8	8.9	7.8	8.8
	2.29	2.52	2.50	2.45	2.49	2.26	1.97	2.07	2.16	2.34	2.19	1.94	2.13
100	9.2	10.2	9.4	8.0	7.7	7.3	9.1	10.4	10.4	10.6	9.7	8.4	9.5
	2.21	2.44	2.42	2.38	2.41	2.19	1.91	2.02	2.10	2.28	2.13	1.88	2.08
200	10.2	11.3	10.3	8.9	8.5	8.1	10.0	11.4	11.4	11.6	10.7	9.3	10.4
	2.10	2.31	2.29	2.25	2.28	2.07	1.81	1.94	2.01	2.17	2.01	1.77	1.99
Freq	7.3	8.3	6.1	4.3	5.7	6.7	7.8	10.3	12.1	13.8	10.6	7.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	5.7	4.8	4.3	4.2	4.0	5.3	5.9	5.8	5.8	4.9	4.5	5.2
	1.91	2.00	2.00	1.91	1.99	1.74	1.65	1.73	1.79	1.92	1.60	1.54	1.73
25	6.2	6.8	5.7	5.2	5.0	4.8	6.3	7.0	6.9	7.0	5.9	5.4	6.2
	2.06	2.16	2.16	2.06	2.15	1.87	1.76	1.82	1.91	2.06	1.73	1.66	1.85
50	7.1	7.8	6.6	5.9	5.8	5.5	7.3	8.0	7.9	8.0	6.8	6.3	7.2
	2.32	2.42	2.43	2.31	2.42	2.10	1.96	1.98	2.10	2.29	1.94	1.86	2.05
100	8.4	9.3	7.8	7.1	6.9	6.6	8.6	9.3	9.3	9.5	8.1	7.6	8.5
	2.47	2.58	2.59	2.46	2.58	2.24	2.09	2.13	2.25	2.45	2.06	1.98	2.19
200	10.5	11.6	9.8	8.8	8.6	8.2	10.6	11.1	11.3	11.7	10.1	9.4	10.4
	2.36	2.47	2.47	2.35	2.46	2.14	2.00	2.05	2.16	2.34	1.97	1.89	2.11
Freq	7.6	8.5	5.2	4.1	6.4	6.7	8.2	10.9	12.4	14.2	9.2	6.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	5.0	4.0	3.7	3.7	3.4	4.7	5.2	5.0	5.1	4.1	4.0	4.5
	1.93	2.06	2.03	1.89	2.04	1.71	1.68	1.74	1.81	1.93	1.54	1.57	1.74
25	5.6	6.2	5.0	4.6	4.6	4.3	5.8	6.3	6.2	6.3	5.1	4.9	5.6
	2.06	2.21	2.18	2.03	2.19	1.83	1.78	1.83	1.91	2.06	1.65	1.68	1.85
50	6.5	7.3	5.8	5.4	5.3	5.0	6.8	7.4	7.2	7.3	6.0	5.8	6.6
	2.28	2.44	2.41	2.24	2.42	2.02	1.94	1.96	2.08	2.26	1.83	1.86	2.01
100	7.8	8.6	7.0	6.4	6.4	6.0	8.1	8.6	8.5	8.7	7.2	7.0	7.8
	2.51	2.69	2.65	2.46	2.66	2.22	2.13	2.15	2.29	2.49	2.01	2.05	2.21
200	9.6	10.7	8.6	7.9	7.8	7.3	9.8	10.3	10.3	10.7	8.8	8.6	9.5
	2.40	2.57	2.53	2.36	2.55	2.12	2.05	2.08	2.20	2.38	1.92	1.96	2.13
Freq	7.7	8.6	4.8	4.0	6.6	6.7	8.3	11.2	12.5	14.4	8.7	6.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.9	3.2	2.9	2.9	2.9	3.8	4.1	4.0	4.0	3.2	3.2	3.6
	1.95	2.06	2.01	1.92	2.01	1.67	1.71	1.76	1.84	1.92	1.54	1.62	1.75
25	4.8	5.2	4.2	3.8	3.8	3.8	5.0	5.3	5.2	5.2	4.2	4.2	4.7
	2.07	2.19	2.13	2.04	2.12	1.77	1.79	1.84	1.94	2.03	1.63	1.72	1.85
50	5.8	6.2	5.0	4.7	4.6	4.6	6.0	6.4	6.3	6.3	5.1	5.1	5.7
	2.25	2.38	2.32	2.22	2.31	1.92	1.92	1.95	2.08	2.19	1.77	1.87	1.98
100	6.9	7.5	6.0	5.6	5.5	5.6	7.2	7.6	7.5	7.6	6.2	6.2	6.8
	2.56	2.71	2.64	2.53	2.63	2.19	2.17	2.17	2.35	2.49	2.01	2.12	2.23
200	8.5	9.2	7.4	6.8	6.8	6.8	8.7	9.1	9.1	9.2	7.6	7.6	8.3
	2.47	2.61	2.55	2.43	2.53	2.11	2.10	2.13	2.28	2.41	1.94	2.05	2.18
Freq	7.8	8.1	4.7	4.3	6.7	6.8	8.6	11.4	12.7	13.7	8.4	6.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	334	4.6	136	4.0	90	3.2	43
25	7.2	426	5.5	214	5.0	157	4.2	93
50	7.8	514	6.4	294	5.8	229	5.0	151
100	8.4	668	7.5	455	6.9	350	6.1	235
200	9.3	933	9.2	878	8.4	660	7.4	431

Cambrai

50° 13′ 00″ N 03° 09′ 00″ E	UTM 31 E 510702 m N 5562844 m	77 m a.s.l.

Located in very open and rather flat terrain in northern France, 7 km NW of the town of Cambrai. The anemometer is placed between runways at the airport. There are no obstacles closer than 700 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	850	0.20	1300	0.03	3750	0.25						
30	0.01	1000	0.20	1500	0.05								
60	0.01	1250	0.05										
90	0.01	1250	0.03	2300	0.10								
120	0.01	1000	0.05										
150	0.01	700	0.10	1500	0.03	2800	0.15						
180	0.01	750	0.20	1500	0.03	3000	0.07						
210	0.01	1500	0.03	3000	0.07								
240	0.01	2000	0.03										
270	0.01	1600	0.03	3100	0.10								
300	0.01	1500	0.03	3500	0.15								
330	0.01	1000	0.03	3750	0.15								

Height of anemometer: 10.6 m a.g.l. Period: 70010100–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.5	57	103	171	182	159	129	88	54	28	21	6	1	0	0	4.7	1.97
30	9.0	53	83	148	191	189	127	104	50	25	25	4	1	0	0	4.9	2.12
60	6.6	60	96	169	201	161	117	86	51	28	26	4	1	0	0	4.7	1.92
90	3.5	112	165	231	205	139	72	45	19	7	4	0	1	0	0	3.6	1.86
120	2.9	122	157	208	183	138	88	48	29	18	8	1	0	0	0	3.8	1.77
150	8.0	48	83	146	156	175	131	98	68	43	45	6	0	0	0	5.2	2.07
180	12.6	34	55	107	144	153	144	125	88	54	66	23	6	1	0	6.0	2.12
210	13.1	27	45	85	124	138	137	126	100	80	88	35	10	3	1	6.6	2.16
240	12.5	30	53	107	148	181	142	110	83	56	61	20	6	2	2	5.9	1.94
270	10.8	39	72	124	155	152	130	101	76	58	59	22	7	4	2	5.7	1.81
300	7.4	71	109	170	145	148	112	77	53	44	49	13	6	1	0	5.0	1.69
330	6.1	81	135	193	171	149	109	63	40	25	22	9	4	2	0	4.4	1.63
Total	100.0	50	82	139	160	159	127	99	68	46	48	15	5	1	1	5.4	1.86

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.5	4.9	4.7	4.3	3.8	3.3	3.2	3.1	3.8	4.0	5.2	5.1	4.2
3	5.4	4.9	4.6	4.4	3.8	3.2	3.2	3.0	3.7	4.0	5.2	5.2	4.2
6	5.4	5.0	4.6	4.4	3.9	3.4	3.5	3.2	3.7	3.9	5.3	5.3	4.3
9	5.6	5.2	5.5	5.8	4.8	4.3	4.5	4.3	4.8	4.6	5.6	5.4	5.0
12	6.3	6.1	6.2	6.4	5.5	5.1	5.1	4.9	5.5	5.3	6.3	6.0	5.7
15	5.8	5.7	6.1	6.5	5.6	5.1	5.3	5.0	5.2	4.9	5.6	5.5	5.5
18	5.5	4.8	4.8	5.4	4.7	4.5	4.6	4.2	4.0	3.9	5.2	5.2	4.7
21	5.5	4.9	4.6	4.4	3.9	3.5	3.3	3.2	3.7	4.0	5.3	5.2	4.3
Day	5.6	5.2	5.1	5.2	4.5	4.0	4.1	3.8	4.3	4.3	5.5	5.4	4.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.6	6.8	6.5	5.6	5.1	7.3	8.3	8.9	8.2	7.9	7.3	6.4	7.4
	2.21	2.45	2.35	2.16	2.10	2.37	2.47	2.51	2.35	2.20	2.04	1.93	2.18
25	7.3	7.4	7.1	6.1	5.6	7.9	9.1	9.7	8.9	8.7	8.0	7.0	8.1
	2.28	2.53	2.42	2.23	2.17	2.44	2.55	2.58	2.43	2.27	2.11	1.99	2.24
50	7.8	7.9	7.6	6.6	6.0	8.5	9.7	10.4	9.6	9.3	8.6	7.5	8.7
	2.35	2.60	2.49	2.29	2.22	2.51	2.62	2.65	2.49	2.33	2.16	2.05	2.30
100	8.4	8.6	8.3	7.1	6.5	9.2	10.6	11.2	10.4	10.1	9.3	8.2	9.5
	2.27	2.51	2.41	2.22	2.15	2.42	2.54	2.57	2.41	2.26	2.10	1.98	2.23
200	9.4	9.5	9.1	7.9	7.2	10.2	11.7	12.4	11.5	11.2	10.3	9.0	10.5
	2.15	2.38	2.28	2.10	2.04	2.30	2.40	2.45	2.28	2.14	1.98	1.88	2.13
Freq	7.1	8.6	7.3	4.4	3.1	6.5	11.3	13.0	12.6	11.3	8.4	6.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.7	4.5	3.6	3.6	5.2	5.9	6.3	5.5	5.5	4.9	4.3	5.2
	1.94	2.09	1.90	1.83	1.75	2.05	2.09	2.13	1.93	1.80	1.69	1.62	1.85
25	5.6	5.7	5.4	4.3	4.4	6.2	7.0	7.5	6.6	6.6	5.9	5.2	6.2
	2.09	2.26	2.06	1.97	1.88	2.21	2.26	2.29	2.08	1.94	1.82	1.74	1.99
50	6.5	6.5	6.2	5.0	5.1	7.2	8.1	8.6	7.6	7.6	6.8	6.0	7.2
	2.35	2.54	2.31	2.21	2.12	2.49	2.54	2.54	2.34	2.17	2.05	1.96	2.21
100	7.7	7.8	7.3	5.9	6.0	8.5	9.6	10.1	9.0	9.0	8.1	7.2	8.5
	2.51	2.70	2.46	2.36	2.26	2.65	2.70	2.71	2.49	2.31	2.18	2.09	2.35
200	9.6	9.6	9.1	7.4	7.5	10.6	12.0	12.4	11.2	11.2	10.1	8.9	10.6
	2.39	2.58	2.35	2.25	2.15	2.53	2.58	2.60	2.38	2.21	2.08	1.99	2.26
Freq	7.4	8.9	6.7	3.7	2.9	7.7	12.4	13.1	12.5	10.9	7.6	6.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.1	3.9	3.1	3.3	4.6	5.2	5.5	4.8	4.8	4.2	3.8	4.5
	1.97	2.09	1.93	1.85	1.74	2.05	2.10	2.13	1.94	1.81	1.67	1.65	1.87
25	5.1	5.1	4.8	3.8	4.1	5.7	6.4	6.7	5.9	5.9	5.2	4.7	5.6
	2.11	2.24	2.07	1.98	1.86	2.19	2.25	2.26	2.07	1.94	1.78	1.76	1.99
50	6.0	5.9	5.7	4.5	4.8	6.6	7.4	7.8	6.9	7.0	6.1	5.5	6.6
	2.33	2.48	2.29	2.19	2.06	2.42	2.49	2.47	2.29	2.13	1.97	1.95	2.18
100	7.1	7.1	6.7	5.3	5.7	7.9	8.9	9.2	8.2	8.3	7.3	6.6	7.8
	2.56	2.72	2.51	2.40	2.26	2.67	2.74	2.72	2.52	2.35	2.16	2.14	2.38
200	8.8	8.7	8.3	6.6	7.1	9.8	10.9	11.3	10.1	10.2	9.0	8.1	9.6
	2.45	2.61	2.41	2.30	2.17	2.55	2.62	2.61	2.41	2.25	2.07	2.05	2.29
Freq	7.6	8.9	6.5	3.5	3.1	8.2	12.6	13.1	12.4	10.7	7.3	6.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.2	3.0	2.5	2.9	3.7	4.1	4.2	3.8	3.8	3.3	3.0	3.6
	1.97	2.06	1.92	1.83	1.79	2.08	2.12	2.11	1.97	1.81	1.67	1.70	1.88
25	4.3	4.3	4.0	3.2	3.8	4.9	5.4	5.6	5.0	4.9	4.3	4.0	4.7
	2.09	2.19	2.04	1.94	1.90	2.20	2.24	2.22	2.09	1.92	1.76	1.80	1.98
50	5.2	5.1	4.8	3.9	4.6	5.9	6.5	6.7	6.0	6.0	5.2	4.8	5.7
	2.27	2.37	2.21	2.11	2.06	2.39	2.44	2.40	2.27	2.08	1.92	1.96	2.14
100	6.2	6.2	5.8	4.7	5.5	7.1	7.8	8.0	7.3	7.2	6.3	5.8	6.8
	2.59	2.70	2.52	2.40	2.35	2.72	2.78	2.72	2.58	2.37	2.18	2.23	2.41
200	7.6	7.6	7.1	5.8	6.8	8.6	9.6	9.7	8.9	8.8	7.7	7.1	8.4
	2.49	2.61	2.43	2.32	2.26	2.62	2.67	2.63	2.49	2.29	2.10	2.15	2.34
Freq	7.8	8.6	6.1	3.4	3.7	8.8	12.7	13.1	12.2	10.2	7.2	6.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	308	4.6	123	4.0	81	3.2	39
25	7.2	394	5.5	195	5.0	143	4.2	85
50	7.7	479	6.4	273	5.8	211	5.0	139
100	8.4	625	7.5	433	6.9	332	6.1	222
200	9.3	880	9.3	855	8.5	638	7.4	412

Carcassonne

43° 13′ 00″ N	02° 19′ 00″ E	UTM 31	E 444496 m	N 4785189 m	130 m a.s.l.

Located in southern France between the Pyrenées and the Massif Central, 65 km from the Mediterranean Sea. The station is situated in the valley of the River Aude, at the western outskirts of the city of Carcassonne. The valley runs W-E and extends approx. 5 km to the N and S from the site. The valley and the hills to the N are mostly covered by vineyards, whereas the hills to the S are covered by forests. The anemometer is placed at the southern edge of the aerodrome with buildings appearing in the E and NW sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	300	0.20										
30	0.01	400	0.20										
60	0.01	650	0.20										
90	0.03	100	0.15	2200	0.50								
120	0.03	100	0.20	2000	0.40	2700	0.20						
150	0.03	100	0.20										
180	0.03	100	0.20										
210	0.03	100	0.20										
240	0.03	100	0.20										
270	0.03	100	0.20										
300	0.01	500	0.20										
330	0.01	400	0.20										

Height of anemometer: 11.2 m a.g.l. Period: 73052500–78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	0.8	552	224	90	45	37	15	7	15	15	0	0	0	0	0	1.4	0.87
30	0.9	510	259	150	54	14	0	0	7	0	0	7	0	0	0	1.5	0.99
60	5.1	102	70	104	91	106	110	104	110	80	94	24	6	0	0	6.3	2.13
90	16.3	38	55	75	100	133	140	131	118	82	88	31	5	2	0	6.7	2.38
120	5.3	96	118	145	173	151	112	81	51	35	28	9	1	0	0	4.7	1.79
150	1.6	398	375	147	42	27	0	4	4	4	0	0	0	0	0	1.7	1.27
180	3.1	290	368	296	37	4	2	0	2	0	0	0	0	0	0	1.9	2.00
210	3.5	273	449	232	35	5	0	4	2	0	0	0	0	0	0	1.8	1.83
240	6.0	96	203	186	180	153	85	49	23	8	14	3	0	0	0	3.8	1.77
270	30.6	29	59	120	153	170	151	118	79	51	51	15	4	1	0	5.7	2.09
300	23.9	31	35	61	93	117	134	138	127	104	116	33	10	1	2	7.2	2.55
330	2.8	153	85	74	57	94	83	142	85	90	99	29	9	0	2	6.4	2.11
Total	100.0	77	97	111	115	128	120	107	86	63	68	20	5	1	1	5.8	1.96

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.6	4.7	4.5	4.3	3.8	3.5	3.1	3.1	3.5	4.1	4.3	4.5	4.0
3	4.6	4.6	4.3	4.4	3.7	3.5	3.2	3.2	3.4	4.0	4.2	4.4	3.9
6	4.6	4.6	4.3	4.4	4.1	3.9	3.6	3.2	3.4	4.3	4.4	4.4	4.1
9	4.8	5.2	5.8	6.6	6.0	5.9	5.6	5.2	5.2	5.5	4.9	4.7	5.4
12	6.1	6.9	7.3	7.4	6.7	6.2	6.0	5.9	6.4	6.8	6.5	6.0	6.5
15	6.4	7.1	7.7	7.3	6.7	6.4	6.3	6.1	6.2	6.4	6.2	6.0	6.5
18	4.8	5.1	5.8	5.8	5.7	5.6	5.6	5.0	4.4	4.4	4.8	4.9	5.1
21	4.7	4.8	4.7	4.3	4.0	3.5	3.4	3.4	3.5	4.2	4.6	4.6	4.1
Day	5.1	5.4	5.6	5.6	5.1	4.8	4.6	4.4	4.5	5.0	5.0	4.9	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	2.4	8.9	11.4	10.3	6.5	3.3	3.3	5.6	9.8	10.4	10.4	9.5
	1.60	1.07	2.24	2.55	2.28	1.65	1.99	2.14	1.69	2.28	2.61	2.74	2.10
25	7.9	2.6	9.7	12.4	11.3	7.1	3.6	3.6	6.2	10.7	11.4	11.4	10.3
	1.63	1.10	2.30	2.58	2.31	1.71	2.06	2.21	1.74	2.32	2.66	2.80	2.13
50	8.4	2.8	10.3	13.2	12.0	7.6	3.8	3.8	6.6	11.4	12.1	12.2	11.0
	1.68	1.13	2.36	2.64	2.37	1.75	2.11	2.27	1.79	2.39	2.73	2.88	2.18
100	9.1	3.0	11.1	14.1	12.8	8.3	4.2	4.1	7.2	12.2	13.0	13.1	11.8
	1.64	1.10	2.30	2.61	2.34	1.70	2.05	2.19	1.73	2.34	2.68	2.82	2.15
200	9.8	3.3	12.2	15.3	13.9	9.1	4.6	4.6	7.9	13.3	14.1	14.2	12.9
	1.58	1.04	2.20	2.55	2.27	1.61	1.94	2.08	1.64	2.26	2.59	2.72	2.10
Freq	1.5	0.9	3.5	12.0	9.4	3.0	2.4	3.3	5.1	21.2	26.9	10.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	1.6	6.4	8.3	6.6	3.0	2.3	2.3	4.4	7.0	7.5	7.3	6.7
	0.96	0.96	2.04	2.33	1.86	1.09	1.81	1.74	1.62	2.06	2.42	2.32	1.89
25	3.5	2.0	7.6	9.7	7.8	3.7	2.8	2.7	5.3	8.3	8.9	8.6	7.9
	1.01	1.03	2.17	2.41	1.94	1.17	1.96	1.88	1.75	2.15	2.54	2.44	1.97
50	4.1	2.4	8.7	10.9	8.8	4.3	3.2	3.2	6.2	9.4	10.1	9.8	9.0
	1.08	1.15	2.37	2.54	2.08	1.31	2.20	2.12	1.97	2.31	2.72	2.63	2.09
100	4.8	2.9	10.1	12.3	10.1	5.2	3.8	3.8	7.4	10.8	11.5	11.2	10.3
	1.16	1.22	2.55	2.72	2.24	1.38	2.34	2.25	2.09	2.48	2.93	2.83	2.22
200	5.7	3.5	12.3	14.2	12.0	6.4	4.8	4.7	9.1	12.7	13.7	13.3	12.2
	1.12	1.17	2.44	2.65	2.16	1.33	2.24	2.15	2.00	2.40	2.83	2.72	2.19
Freq	1.1	0.9	4.6	14.6	6.9	2.2	2.8	3.4	5.7	27.0	25.3	5.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	1.4	5.6	7.2	5.4	2.0	2.0	2.0	4.0	6.2	6.6	6.2	5.8
	0.81	0.97	2.09	2.35	1.81	1.01	1.84	1.71	1.69	2.08	2.47	2.20	1.89
25	2.0	1.8	6.9	8.8	6.6	2.6	2.5	2.4	5.0	7.5	8.1	7.6	7.1
	0.85	1.03	2.20	2.42	1.89	1.08	1.97	1.83	1.81	2.17	2.58	2.30	1.96
50	2.5	2.2	8.0	10.0	7.6	3.1	3.0	2.9	5.8	8.6	9.3	8.7	8.2
	0.92	1.13	2.38	2.53	2.03	1.19	2.18	2.03	2.00	2.30	2.74	2.45	2.07
100	3.1	2.6	9.4	11.4	8.9	3.8	3.5	3.4	7.0	10.0	10.7	10.1	9.5
	1.00	1.24	2.62	2.74	2.22	1.30	2.39	2.23	2.20	2.52	3.01	2.69	2.23
200	3.7	3.2	11.3	13.3	10.6	4.6	4.4	4.2	8.6	11.8	12.7	12.0	11.3
	0.97	1.19	2.52	2.68	2.15	1.24	2.29	2.13	2.10	2.44	2.91	2.60	2.20
Freq	0.9	0.9	4.9	15.6	6.0	1.8	3.0	3.5	5.9	29.1	24.7	3.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.1	1.8	4.7	5.7	4.0	1.5	1.6	1.7	3.6	4.9	5.2	4.7	4.6
	0.90	0.95	2.13	2.34	1.78	1.34	1.87	1.49	1.75	2.12	2.53	2.06	1.91
25	1.5	2.4	6.1	7.3	5.2	2.0	2.2	2.3	4.7	6.3	6.8	6.2	6.0
	0.95	1.00	2.22	2.40	1.87	1.42	1.99	1.58	1.86	2.20	2.62	2.14	1.97
50	1.9	2.9	7.2	8.7	6.2	2.4	2.6	2.8	5.7	7.6	8.1	7.3	7.1
	1.02	1.08	2.35	2.49	1.99	1.53	2.16	1.72	2.01	2.31	2.76	2.25	2.06
100	2.3	3.7	8.6	10.1	7.4	3.0	3.2	3.4	6.9	8.9	9.5	8.7	8.4
	1.15	1.22	2.60	2.65	2.24	1.74	2.46	1.96	2.30	2.52	3.02	2.47	2.22
200	2.8	4.4	10.2	11.8	9.0	3.6	3.9	4.2	8.5	10.5	11.3	10.3	10.0
	1.11	1.17	2.56	2.69	2.18	1.68	2.37	1.88	2.21	2.51	3.01	2.45	2.23
Freq	0.8	1.2	5.7	15.7	5.1	1.7	3.1	3.6	7.4	30.6	22.4	2.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.4	657	5.9	259	5.2	170	4.1	82
25	9.2	842	7.0	408	6.3	297	5.3	176
50	9.8	1007	7.9	562	7.3	434	6.3	285
100	10.5	1258	9.1	807	8.4	632	7.5	441
200	11.4	1647	10.8	1356	10.0	1059	8.9	734

Cherbourg

49° 39 ′ 00″ N 01° 28 ′ 00″ W	UTM 30 E 610688 m N 5500956 m	138 m a.s.l.

Location at the tip of the Cherbourg persinsula in Normandy, 2 km SE of the Channel coast, and 10 km E of the centre of the city of Cherbourg. The terrain is somewhat undulating and has a closed appearance due to the many shelterbelts. In the sectors WNW through N the terrain slopes down to the Channel with a gradient of approx. 150 m in 2 km.
The anemometer is placed at the southern edge of the aerodrome with a row of trees appearing in the S sector at a distance of approx. 100 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	500	0.30	3500	0.00							4	-5
30	0.03	600	0.30									-3	-2
60	0.01	750	0.30									-1	3
90	0.01	1300	0.30									7	5
120	0.01	150	0.30									15	2
150	0.01	100	0.30									15	-3
180	0.05	300	0.30									5	-6
210	0.05	300	0.30									-3	-2
240	0.10	300	0.30									-2	4
270	0.05	400	0.30									8	5
300	0.03	200	0.30	3000	0.00							13	2
330	0.03	700	0.30	2500	0.00							10	-3

Height of anemometer: 10.5 m a.g.l. Period: 70010100-78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.7	98	63	127	148	133	94	90	68	71	66	25	14	0	2	5.5	1.66
30	6.1	95	59	98	123	120	101	100	91	72	91	37	8	2	3	6.2	1.87
60	7.9	58	49	76	96	119	102	104	112	107	119	45	12	1	0	7.0	2.33
90	7.7	61	42	79	111	127	127	113	119	86	85	38	8	2	0	6.6	2.23
120	5.5	84	73	131	154	159	148	101	66	39	37	5	3	0	0	5.2	2.09
150	6.4	93	115	171	185	163	117	64	43	25	21	5	0	0	0	4.4	1.87
180	8.1	80	121	164	176	147	100	70	49	38	38	12	4	0	0	4.6	1.64
210	9.9	64	71	140	159	131	114	89	75	61	53	27	12	3	1	5.6	1.70
240	11.2	54	59	106	143	130	117	103	88	74	76	30	17	2	1	6.2	1.89
270	13.2	47	48	87	123	135	127	114	98	77	83	39	15	4	2	6.6	1.99
300	10.9	60	56	110	143	116	115	115	80	73	75	35	16	4	1	6.3	1.89
330	7.5	80	71	129	135	139	103	92	67	70	60	25	20	9	2	5.7	1.60
Total	100.0	69	67	116	140	134	114	98	82	68	69	29	12	3	1	5.9	1.82

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.8	5.6	5.2	5.3	4.4	3.8	3.5	3.4	4.1	4.3	5.3	5.7	4.7
3	5.8	5.6	5.0	5.3	4.3	3.8	3.5	3.3	4.3	4.4	5.4	5.5	4.7
6	5.9	5.7	5.1	5.6	4.6	4.1	3.8	3.4	4.4	4.5	5.5	5.6	4.8
9	5.8	6.0	5.9	6.5	5.6	5.0	4.6	4.4	5.2	5.0	5.4	5.8	5.4
12	6.5	6.5	6.5	6.8	6.1	5.6	5.2	5.1	5.7	5.5	6.0	6.2	6.0
15	6.4	6.5	6.6	6.8	6.1	5.6	5.5	5.1	5.8	5.4	5.7	5.9	5.9
18	5.9	5.6	5.4	5.9	5.4	4.9	4.7	4.2	4.5	4.5	5.5	5.7	5.2
21	5.9	5.7	5.2	5.3	4.4	3.8	3.7	3.5	4.2	4.5	5.5	5.8	4.8
Day	6.0	5.9	5.6	5.9	5.1	4.6	4.3	4.0	4.8	4.8	5.5	5.8	5.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.0	9.5	10.5	9.5	8.8	7.9	7.8	9.2	10.8	10.6	8.8	7.2	9.2
	1.63	1.91	2.42	2.48	2.47	2.28	1.98	1.77	1.96	2.09	1.86	1.69	1.91
25	7.7	10.4	11.5	10.4	9.6	8.6	8.5	10.1	11.8	11.6	9.6	7.9	10.1
	1.67	1.94	2.46	2.53	2.54	2.35	2.03	1.79	1.98	2.12	1.89	1.74	1.95
50	8.2	11.0	12.2	11.1	10.3	9.3	9.1	10.7	12.5	12.4	10.2	8.5	10.7
	1.72	1.99	2.53	2.60	2.61	2.41	2.08	1.83	2.01	2.16	1.94	1.78	1.99
100	8.9	11.8	13.1	12.0	11.1	10.1	9.9	11.4	13.4	13.2	10.9	9.1	11.5
	1.67	1.96	2.49	2.55	2.53	2.33	2.03	1.81	2.01	2.15	1.91	1.73	1.97
200	9.7	12.7	14.2	13.1	12.3	11.1	10.8	12.3	14.3	14.2	11.9	10.0	12.5
	1.59	1.91	2.41	2.44	2.41	2.21	1.93	1.77	1.97	2.10	1.84	1.65	1.92
Freq	6.2	6.5	8.3	7.8	5.5	5.3	7.1	10.1	12.4	12.7	10.5	7.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	7.2	7.5	6.4	6.1	5.3	5.4	6.9	8.0	7.5	5.8	4.7	6.5
	1.40	1.80	2.26	2.15	2.07	1.87	1.66	1.65	1.86	1.95	1.61	1.38	1.72
25	5.9	8.4	8.9	7.7	7.2	6.4	6.5	8.1	9.4	8.8	6.9	5.7	7.7
	1.50	1.86	2.35	2.30	2.22	2.02	1.77	1.71	1.91	2.01	1.70	1.49	1.79
50	6.9	9.5	10.0	8.8	8.3	7.4	7.5	9.1	10.5	9.9	7.9	6.6	8.8
	1.65	1.96	2.51	2.53	2.48	2.27	1.95	1.79	1.98	2.12	1.85	1.66	1.92
100	8.1	10.8	11.4	10.3	9.8	8.7	8.8	10.3	11.8	11.2	9.2	7.9	10.1
	1.77	2.10	2.70	2.71	2.65	2.42	2.08	1.91	2.12	2.27	1.99	1.77	2.07
200	9.9	12.4	13.4	12.5	12.1	10.9	10.7	11.8	13.4	13.0	11.0	9.7	12.0
	1.70	2.04	2.61	2.60	2.53	2.31	2.00	1.87	2.07	2.20	1.91	1.69	2.04
Freq	5.9	6.7	8.7	7.5	4.9	5.5	7.7	10.9	12.8	12.6	9.8	7.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	6.4	6.5	5.5	5.3	4.6	4.7	6.1	7.0	6.5	4.9	4.0	5.7
	1.42	1.85	2.28	2.16	2.07	1.85	1.64	1.69	1.89	1.96	1.60	1.35	1.72
25	5.4	7.7	8.0	6.8	6.5	5.6	5.8	7.4	8.5	7.9	6.0	5.0	7.0
	1.50	1.90	2.37	2.30	2.20	1.98	1.74	1.73	1.94	2.03	1.69	1.44	1.79
50	6.3	8.9	9.2	7.9	7.6	6.6	6.8	8.5	9.7	9.0	7.0	5.9	8.0
	1.64	1.98	2.51	2.51	2.43	2.19	1.88	1.80	2.00	2.12	1.83	1.59	1.90
100	7.5	10.1	10.6	9.3	9.0	7.9	8.0	9.7	11.0	10.3	8.3	7.1	9.3
	1.80	2.14	2.75	2.76	2.67	2.40	2.07	1.94	2.12	2.31	2.01	1.74	2.07
200	9.1	11.7	12.4	11.4	11.0	9.7	9.7	11.2	12.6	12.0	10.0	8.7	11.0
	1.73	2.10	2.66	2.65	2.56	2.30	1.99	1.90	2.11	2.25	1.94	1.67	2.06
Freq	5.8	6.9	8.9	7.2	4.8	5.6	7.9	11.1	12.9	12.7	9.5	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	5.0	5.1	4.3	4.1	3.6	3.9	4.9	5.5	5.0	3.8	3.2	4.5
	1.45	1.90	2.26	2.17	2.01	1.82	1.63	1.72	1.90	1.96	1.59	1.37	1.74
25	4.7	6.5	6.6	5.7	5.3	4.8	5.1	6.3	7.1	6.5	5.0	4.2	5.8
	1.51	1.95	2.33	2.28	2.13	1.93	1.71	1.76	1.94	2.01	1.66	1.44	1.79
50	5.7	7.7	7.8	6.8	6.4	5.8	6.1	7.5	8.4	7.7	6.0	5.1	7.0
	1.61	2.02	2.45	2.46	2.31	2.10	1.81	1.82	2.00	2.09	1.78	1.56	1.88
100	6.8	9.1	9.2	8.2	7.7	6.9	7.3	8.8	9.8	9.1	7.2	6.2	8.3
	1.79	2.15	2.67	2.79	2.63	2.39	2.00	1.92	2.10	2.24	1.99	1.77	2.04
200	8.2	10.6	10.9	9.9	9.4	8.5	8.7	10.2	11.3	10.6	8.7	7.6	9.8
	1.76	2.18	2.67	2.70	2.53	2.30	1.97	1.96	2.15	2.26	1.94	1.71	2.07
Freq	5.9	7.2	8.7	6.9	4.9	5.9	8.2	11.4	13.1	12.2	9.1	6.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.2	669	5.8	273	5.1	179	4.0	86
25	8.9	852	6.9	425	6.2	311	5.2	184
50	9.5	1015	7.8	578	7.1	447	6.2	294
100	10.2	1267	9.0	811	8.3	640	7.3	448
200	11.1	1659	10.6	1362	9.8	1066	8.7	736

Clermont-Ferrand

45° 47′ 00″ N 03° 10′ 00″ E	UTM 31 E 512956 m N 5070084 m	332 m a.s.l.

Located in the northern part of the Massif Central, on the Limagne plain between Monts d'Auvergne (1500 m) to the W and Monts du Forez (1300 m) to the E. The foothills of Monts d'Auvergne begin 10 km from the site and they are oriented N–S. The eastern mountain range is 30 km away and to the S the plain is bordered by the Livradois mountains. The plain appears open and flat and consists mostly of farmland. In the sectors SE–SW, at a distance of 2 to 4 km, there are several small summits rising about 100 to 200 m above the surrounding terrain.
The centre of the city of Clermont-Ferrand is 7 km W of the site, the suburbs extending to the boundary of the aerodrome except in the sectors N to E. The anemometer is placed at the northern edge of the aerodrome. The village of Aulnat appears close by in the NW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	3000	0.10										
30	0.05												
60	0.05												
90	0.05	4000	0.15										
120	0.01	1200	0.05	2000	0.15								
150	0.01	800	0.10	1750	0.30								
180	0.01	700	0.05	1200	0.25								
210	0.01	800	0.30	2000	0.20								
240	0.01	1400	0.15	2500	0.20								
270	0.01	800	0.10	2500	0.40								
300	0.05	200	0.30	1500	0.07	4000	0.30						
330	0.05	150	0.20	1200	0.07	4000	0.25						

Height of anemometer: 10.5 m a.g.l. Period: 76010103–85123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	13.5	215	237	201	149	102	54	27	11	3	2	0	0	0	0	2.9	1.57
30	10.3	218	247	215	148	94	45	20	7	4	2	1	0	0	0	2.8	1.54
60	5.9	379	303	189	81	36	10	1	1	0	1	0	0	0	0	1.8	1.40
90	4.8	461	348	142	36	7	5	1	0	0	0	0	0	0	0	1.5	1.46
120	4.7	435	349	150	46	11	7	0	1	1	0	0	0	0	0	1.6	1.40
150	6.4	331	267	168	91	58	33	16	11	8	12	3	0	1	0	2.2	1.05
180	14.8	140	120	122	124	118	103	78	61	47	50	22	8	2	1	5.0	1.57
210	9.7	190	156	144	128	105	100	70	40	26	30	7	2	0	0	4.0	1.49
240	7.5	258	186	144	103	93	76	55	35	20	18	7	3	0	0	3.3	1.25
270	7.8	260	167	116	105	87	90	61	35	30	30	13	5	0	1	3.8	1.27
300	6.3	295	214	148	116	89	67	31	18	10	7	4	0	0	0	2.8	1.26
330	8.3	279	263	182	129	77	40	19	7	2	0	0	0	0	0	2.4	1.41
Total	100.0	258	221	161	115	84	60	38	23	15	16	6	2	0	0	3.0	1.18

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.7	2.6	3.0	2.3	1.7	1.6	1.4	1.3	1.8	2.2	2.6	3.2	2.2
3	2.5	2.6	2.8	2.2	1.7	1.4	1.2	1.3	1.6	2.3	2.7	3.1	2.1
6	2.6	2.7	2.8	2.2	1.9	1.8	1.5	1.3	1.6	2.2	2.5	3.0	2.2
9	2.6	3.1	3.6	3.7	2.9	2.6	2.4	2.1	2.4	3.0	2.9	3.2	2.9
12	3.6	3.8	4.4	4.4	3.4	3.2	3.2	2.8	2.8	3.4	3.4	3.9	3.5
15	3.2	3.8	4.6	4.9	3.6	3.6	3.5	3.2	3.3	3.4	3.2	3.4	3.6
18	2.6	2.9	3.5	4.2	3.2	3.3	3.3	2.8	2.4	2.5	2.6	2.9	3.0
21	2.6	2.5	3.0	2.5	2.0	1.8	1.9	1.5	1.9	2.1	2.5	3.0	2.3
Day	2.8	3.0	3.5	3.3	2.6	2.4	2.3	2.0	2.2	2.6	2.8	3.2	2.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.2	3.4	2.5	2.3	3.1	6.8	6.7	5.4	5.5	5.3	4.6	4.8
	1.81	1.81	1.65	1.63	1.65	1.20	1.63	1.78	1.60	1.48	1.47	1.58	1.40
25	4.9	4.7	3.8	2.7	2.5	3.4	7.5	7.4	5.9	6.0	5.8	5.1	5.2
	1.87	1.86	1.70	1.68	1.71	1.24	1.67	1.83	1.65	1.52	1.51	1.63	1.44
50	5.2	5.0	4.1	2.9	2.7	3.7	8.0	7.9	6.4	6.5	6.3	5.5	5.6
	1.91	1.91	1.74	1.73	1.75	1.26	1.72	1.88	1.69	1.56	1.55	1.67	1.47
100	5.7	5.4	4.4	3.2	2.9	3.9	8.7	8.6	6.9	7.0	6.8	5.9	6.1
	1.85	1.85	1.69	1.67	1.70	1.23	1.67	1.82	1.63	1.51	1.51	1.62	1.44
200	6.3	6.0	4.8	3.5	3.2	4.3	9.4	9.5	7.6	7.7	7.5	6.5	6.7
	1.76	1.75	1.60	1.58	1.61	1.17	1.60	1.73	1.55	1.44	1.43	1.54	1.38
Freq	11.6	11.6	7.5	5.2	4.8	5.8	11.9	11.5	8.3	7.7	6.8	7.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.9	2.1	1.6	1.5	2.2	5.1	4.3	3.4	3.9	3.5	3.1	3.3
	1.54	1.52	1.34	1.40	1.40	1.03	1.51	1.48	1.28	1.26	1.24	1.39	1.22
25	3.7	3.5	2.5	2.0	1.9	2.7	6.1	5.2	4.2	4.7	4.3	3.7	3.9
	1.66	1.63	1.44	1.50	1.51	1.11	1.61	1.59	1.38	1.35	1.34	1.50	1.30
50	4.3	4.1	2.9	2.3	2.2	3.2	7.1	6.1	4.9	5.5	5.1	4.4	4.6
	1.86	1.83	1.62	1.69	1.69	1.24	1.76	1.78	1.54	1.51	1.50	1.68	1.42
100	5.1	4.9	3.5	2.8	2.6	3.9	8.3	7.3	5.9	6.6	6.0	5.2	5.5
	1.98	1.95	1.72	1.79	1.80	1.31	1.88	1.90	1.64	1.61	1.60	1.79	1.50
200	6.4	6.1	4.3	3.4	3.3	4.8	10.0	9.0	7.3	8.1	7.5	6.4	6.8
	1.89	1.87	1.65	1.71	1.72	1.26	1.81	1.81	1.57	1.54	1.52	1.71	1.46
Freq	13.0	10.7	6.4	4.9	4.8	6.2	13.9	10.3	7.8	7.8	6.4	8.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.6	1.7	1.4	1.4	2.0	4.6	3.7	3.0	3.4	3.0	2.7	2.9
	1.55	1.53	1.39	1.43	1.39	1.04	1.55	1.49	1.28	1.26	1.25	1.40	1.23
25	3.3	3.2	2.2	1.8	1.7	2.5	5.6	4.6	3.7	4.3	3.8	3.3	3.6
	1.66	1.63	1.49	1.53	1.49	1.11	1.63	1.59	1.37	1.35	1.33	1.50	1.30
50	4.0	3.8	2.6	2.1	2.1	3.0	6.6	5.4	4.4	5.1	4.6	3.9	4.2
	1.83	1.81	1.64	1.69	1.64	1.22	1.76	1.75	1.51	1.48	1.47	1.65	1.40
100	4.7	4.5	3.1	2.5	2.5	3.7	7.7	6.5	5.3	6.1	5.5	4.7	5.1
	2.01	1.98	1.80	1.86	1.80	1.33	1.94	1.92	1.65	1.63	1.61	1.82	1.51
200	5.8	5.5	3.8	3.0	3.0	4.5	9.3	8.0	6.5	7.5	6.7	5.8	6.2
	1.92	1.90	1.73	1.78	1.73	1.27	1.87	1.84	1.58	1.56	1.54	1.74	1.47
Freq	13.5	10.4	6.0	4.8	4.7	6.3	14.6	9.8	7.6	7.8	6.2	8.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.1	2.0	1.4	1.1	1.2	1.9	3.6	2.8	2.3	2.7	2.4	2.1	2.2
	1.55	1.51	1.42	1.39	1.20	1.07	1.56	1.47	1.26	1.28	1.26	1.44	1.24
25	2.8	2.6	1.8	1.5	1.5	2.6	4.7	3.8	3.1	3.6	3.1	2.8	3.0
	1.64	1.60	1.50	1.47	1.27	1.13	1.63	1.56	1.33	1.35	1.33	1.52	1.29
50	3.4	3.2	2.2	1.8	1.9	3.2	5.6	4.6	3.8	4.4	3.8	3.4	3.6
	1.78	1.73	1.62	1.59	1.37	1.23	1.74	1.69	1.44	1.46	1.44	1.65	1.38
100	4.1	3.8	2.7	2.2	2.3	3.9	6.8	5.6	4.7	5.4	4.7	4.1	4.5
	2.03	1.97	1.85	1.81	1.56	1.38	1.95	1.92	1.64	1.66	1.64	1.87	1.53
200	5.0	4.7	3.3	2.6	2.8	4.8	8.1	6.8	5.7	6.5	5.7	5.0	5.4
	1.96	1.90	1.78	1.74	1.50	1.34	1.90	1.85	1.58	1.60	1.58	1.81	1.50
Freq	13.1	9.8	5.8	4.8	4.9	7.3	14.3	9.5	7.5	7.5	6.5	9.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.3	150	3.0	66	2.7	43	2.1	21
25	4.7	189	3.6	101	3.3	74	2.8	44
50	5.1	227	4.2	134	3.8	105	3.3	69
100	5.5	299	5.0	203	4.6	156	4.0	104
200	6.1	428	6.1	402	5.6	300	4.9	193

Dinard

48° 35′ 00″ N 02° 04′ 00″ W	UTM 30 E 568836 m N 5381665 m	59 m a.s.l.

Location in the northern part of Brittany, 6 km S of the Channel coast, 5 km S of the centre of the city of Dinard and 8 km SW of the city of St. Malo. The landscape is characterized by small forests, villages and shelterbelts; altogether resulting in a rather closed appearance.
The anemometer is placed E of the runways with buildings in the NW sector between 150 m and 400 m away.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	200	0.30	1000	0.10	2000	0.40						
30	0.01	100	0.30	500	0.20	2000	0.30						
60	0.01	100	0.30	400	0.20								
90	0.01	100	0.30	500	0.20								
120	0.01	300	0.20										
150	0.01	400	0.30										
180	0.01	500	0.30										
210	0.01	1000	0.20										
240	0.01	750	0.20										
270	0.01	1000	0.20									-4	
300	0.01	1200	0.30	2000	0.20							-11	
330	0.01	1250	0.30	3000	0.20							-8	

Height of anemometer: 10.5 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.9	52	91	147	189	182	136	78	46	35	32	8	4	0	0	4.9	1.92
30	9.0	59	99	168	207	164	131	76	48	29	16	3	1	0	0	4.6	2.00
60	7.7	73	140	206	191	152	99	69	40	16	14	0	0	0	0	4.1	1.90
90	5.2	108	193	237	220	124	67	36	8	7	1	0	0	0	0	3.4	1.96
120	4.7	86	151	226	213	136	97	49	20	12	9	1	1	0	0	3.9	1.85
150	5.9	53	82	158	182	172	132	106	56	29	27	4	0	0	0	4.9	2.10
180	9.0	36	55	132	198	187	142	91	59	36	48	11	4	0	0	5.2	1.93
210	12.2	37	64	152	180	163	116	94	70	43	53	19	4	4	0	5.3	1.76
240	12.7	32	91	153	186	151	117	90	70	42	45	17	5	1	0	5.2	1.77
270	8.3	59	86	138	173	142	107	88	76	47	58	19	6	1	0	5.3	1.73
300	7.6	48	77	115	140	137	138	100	85	58	69	24	7	1	1	5.9	1.95
330	8.9	53	72	125	144	164	147	110	73	50	43	13	6	1	0	5.5	2.04
Total	100.0	53	93	158	184	158	122	85	58	36	38	11	4	1	0	5.0	1.81

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.1	4.7	4.3	3.9	3.4	3.0	2.9	3.0	3.3	3.8	4.8	4.8	3.9
3	5.0	4.6	4.2	4.0	3.3	3.0	2.9	2.9	3.4	3.8	4.7	4.7	3.9
6	4.9	4.7	4.3	4.0	3.6	3.2	3.0	3.0	3.4	3.8	4.8	4.7	3.9
9	5.1	5.0	5.1	5.3	4.9	4.2	4.2	4.1	4.5	4.3	4.9	4.8	4.7
12	5.9	5.7	5.9	6.0	5.3	4.8	4.8	4.8	5.0	4.9	5.6	5.5	5.3
15	5.7	5.6	5.9	6.2	5.4	5.1	5.3	5.1	5.0	4.8	5.2	5.1	5.4
18	4.9	4.5	4.7	5.1	4.7	4.4	4.4	4.2	3.8	3.5	4.6	4.7	4.5
21	4.9	4.6	4.3	4.0	3.5	3.1	3.0	3.0	3.4	3.7	4.8	5.0	3.9
Day	5.2	4.9	4.8	4.8	4.2	3.8	3.8	3.8	4.0	4.1	4.9	4.9	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.8	8.7	8.2	7.0	6.3	7.4	8.3	8.0	7.8	7.9	8.9	9.0	8.1
	2.24	2.26	2.29	2.21	2.22	2.28	2.32	2.14	2.09	2.02	2.08	2.29	2.14
25	9.6	9.5	8.9	7.7	6.9	8.1	9.0	8.8	8.6	8.6	9.7	9.8	8.9
	2.30	2.32	2.36	2.28	2.29	2.35	2.40	2.20	2.15	2.08	2.13	2.34	2.19
50	10.2	10.2	9.6	8.2	7.4	8.6	9.7	9.4	9.2	9.2	10.4	10.5	9.5
	2.36	2.38	2.42	2.34	2.35	2.41	2.46	2.26	2.21	2.13	2.19	2.41	2.26
100	11.1	11.0	10.4	8.9	8.0	9.4	10.5	10.2	9.9	10.0	11.1	11.3	10.3
	2.30	2.32	2.35	2.26	2.27	2.33	2.38	2.20	2.15	2.08	2.14	2.35	2.20
200	12.1	12.1	11.5	9.9	8.9	10.4	11.6	11.2	11.0	11.0	12.1	12.4	11.3
	2.20	2.22	2.22	2.14	2.15	2.21	2.26	2.09	2.04	1.98	2.06	2.25	2.10
Freq	8.8	8.9	8.2	6.2	5.0	5.5	7.8	11.0	12.5	10.0	7.9	8.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.2	6.1	5.5	4.6	4.4	5.4	5.8	5.5	5.4	5.6	6.5	6.2	5.7
	1.90	1.98	1.89	1.87	1.84	2.03	1.94	1.76	1.75	1.71	1.89	2.01	1.83
25	7.3	7.3	6.6	5.6	5.2	6.5	6.9	6.6	6.5	6.7	7.7	7.4	6.8
	2.02	2.11	2.04	2.02	1.98	2.19	2.09	1.88	1.88	1.83	1.98	2.14	1.95
50	8.4	8.4	7.6	6.4	6.1	7.5	8.0	7.6	7.5	7.7	8.8	8.5	7.8
	2.21	2.33	2.30	2.27	2.23	2.46	2.34	2.10	2.11	2.01	2.13	2.36	2.16
100	9.8	9.8	9.1	7.6	7.2	8.9	9.4	8.9	8.9	9.0	10.1	9.9	9.2
	2.37	2.49	2.44	2.42	2.37	2.62	2.50	2.24	2.24	2.15	2.29	2.53	2.31
200	11.8	12.0	11.3	9.5	9.0	11.1	11.7	11.0	11.0	10.9	12.0	12.1	11.2
	2.28	2.39	2.33	2.31	2.27	2.50	2.39	2.14	2.15	2.06	2.21	2.42	2.23
Freq	8.8	8.9	7.9	5.6	4.8	5.8	8.6	11.8	12.6	8.9	7.7	8.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.3	4.8	4.0	3.8	4.8	5.1	4.8	4.7	4.9	5.8	5.4	4.9
	1.90	1.99	1.90	1.91	1.84	2.06	1.94	1.79	1.78	1.74	1.93	2.01	1.85
25	6.6	6.6	5.9	4.9	4.7	5.9	6.2	5.9	5.8	6.1	7.1	6.6	6.1
	2.00	2.12	2.03	2.05	1.97	2.20	2.06	1.91	1.90	1.84	2.01	2.13	1.96
50	7.7	7.7	6.9	5.8	5.5	6.9	7.3	7.0	6.9	7.1	8.1	7.7	7.1
	2.16	2.30	2.25	2.26	2.18	2.44	2.28	2.10	2.10	2.00	2.14	2.32	2.13
100	9.0	9.0	8.2	6.9	6.6	8.3	8.6	8.3	8.2	8.3	9.4	9.1	8.4
	2.37	2.53	2.47	2.49	2.40	2.68	2.50	2.31	2.31	2.20	2.35	2.55	2.35
200	10.8	10.9	10.1	8.5	8.1	10.2	10.6	10.1	10.1	10.1	11.2	11.0	10.3
	2.29	2.43	2.37	2.38	2.30	2.57	2.40	2.21	2.21	2.12	2.27	2.45	2.27
Freq	8.8	8.9	7.8	5.4	4.8	5.8	8.8	12.1	12.6	8.5	7.6	8.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.2	3.7	3.1	3.1	3.8	4.0	3.8	3.7	4.0	4.5	4.2	3.9
	1.91	2.01	1.89	1.92	1.83	2.08	1.95	1.81	1.79	1.77	1.94	2.03	1.86
25	5.5	5.5	4.9	4.1	4.0	5.1	5.2	5.0	4.9	5.2	5.9	5.5	5.1
	2.00	2.11	2.01	2.04	1.94	2.20	2.06	1.91	1.90	1.86	2.01	2.13	1.96
50	6.6	6.6	5.9	4.9	4.9	6.1	6.3	6.0	5.9	6.2	7.1	6.6	6.2
	2.13	2.27	2.18	2.21	2.10	2.40	2.23	2.06	2.06	1.99	2.12	2.30	2.10
100	7.9	7.9	7.1	5.9	5.9	7.3	7.6	7.2	7.2	7.4	8.4	7.9	7.4
	2.38	2.56	2.49	2.52	2.39	2.73	2.54	2.35	2.34	2.23	2.32	2.60	2.37
200	9.5	9.6	8.6	7.2	7.2	9.0	9.2	8.8	8.8	9.0	9.9	9.6	9.0
	2.33	2.48	2.39	2.43	2.31	2.63	2.45	2.27	2.26	2.18	2.31	2.51	2.31
Freq	8.8	8.9	7.6	5.2	4.8	6.1	9.3	12.2	12.3	8.2	7.7	8.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	405	5.0	163	4.4	108	3.5	52
25	7.8	518	6.0	258	5.4	189	4.5	112
50	8.4	624	6.9	356	6.3	276	5.5	182
100	9.1	806	8.1	547	7.5	422	6.6	284
200	10.0	1117	9.9	1039	9.1	786	8.0	515

Evreux

49° 01′ 00″ N	01° 13′ 00″ E	UTM 31	E 369602 m	N 5430948 m	146 m a.s.l.

Location in NW France 90 km W of Paris and 5 km E of the centre of the city of Evreux. About 35% of the terrain is forested. The aerodrome is situated in a rather open part of the landscape, the closest forest appearing at a distance of 2 km in the NNW sector.
The anemometer is placed SE of the runway with no obstacles occurring closer than 200 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.10										
30	0.01	2000	0.10										
60	0.01	250	0.20										
90	0.01	250	0.30	1300	0.10								
120	0.01	300	0.30	1200	0.20								
150	0.01	300	0.20	1200	0.05	2200	0.30						
180	0.01	900	0.10	1600	0.20								
210	0.01	1000	0.05	2200	0.15								
240	0.01	1200	0.05	2000	0.15	4000	0.40						
270	0.01	1500	0.10	2250	0.40								
300	0.01	1250	0.30										
330	0.01	1000	0.15	2000	0.40								

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.2	80	138	194	191	152	108	74	36	15	10	0	0	0	0	4.2	1.97
30	8.0	64	118	170	162	155	135	83	55	29	25	4	0	0	0	4.7	2.00
60	8.8	62	117	197	201	159	120	67	39	21	12	1	2	0	0	4.3	1.93
90	5.0	112	169	247	196	138	80	35	14	5	3	1	0	0	0	3.5	1.88
120	4.6	135	172	245	213	120	66	30	15	2	2	0	0	0	0	3.4	1.92
150	5.9	95	151	203	193	141	102	62	28	19	7	0	0	0	0	4.0	1.89
180	8.0	60	120	180	171	148	111	79	56	36	30	8	0	0	0	4.7	1.81
210	11.3	55	105	127	158	151	134	89	69	43	53	13	3	0	1	5.3	1.89
240	11.1	50	90	125	151	133	133	106	73	54	57	23	4	0	0	5.6	1.94
270	10.7	53	75	129	169	166	131	99	66	48	44	14	3	1	0	5.3	1.94
300	11.2	60	108	189	182	153	116	74	49	27	29	8	3	0	0	4.6	1.77
330	8.3	82	160	205	189	140	98	56	32	21	11	5	1	0	0	4.0	1.73
Total	100.0	70	120	175	178	148	116	76	49	30	28	8	2	0	0	4.6	1.77

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.2	4.0	4.0	3.9	3.3	2.8	2.7	2.7	2.8	2.9	3.9	4.1	3.5
3	4.3	3.9	4.0	3.7	3.1	2.7	2.7	2.5	2.8	2.9	3.9	4.1	3.4
6	4.3	4.2	3.9	3.9	3.5	3.1	3.0	2.6	2.9	3.0	4.0	4.0	3.5
9	4.4	4.5	4.9	5.2	4.7	4.1	4.1	4.0	4.2	3.9	4.3	4.2	4.4
12	5.1	5.2	5.6	5.8	5.2	4.6	4.7	4.6	4.9	4.7	5.2	5.0	5.1
15	5.0	5.2	5.7	5.9	5.3	4.7	4.8	4.7	4.8	4.6	4.9	4.7	5.0
18	4.4	4.2	4.6	5.0	4.6	4.5	4.5	4.1	3.6	3.2	4.1	4.2	4.3
21	4.4	4.2	4.0	3.9	3.4	3.0	2.9	2.9	3.1	3.0	4.0	4.2	3.6
Day	4.5	4.4	4.6	4.7	4.1	3.7	3.7	3.5	3.7	3.5	4.3	4.3	4.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.2	6.9	6.4	5.5	6.1	6.7	7.3	7.8	7.8	7.1	6.3	6.8
	2.17	2.29	2.27	2.19	2.25	2.18	2.15	2.18	2.24	2.28	2.15	2.04	2.12
25	6.3	6.7	7.6	7.0	6.1	6.6	7.3	7.9	8.5	8.5	7.7	6.8	7.4
	2.24	2.37	2.34	2.26	2.32	2.25	2.22	2.25	2.31	2.35	2.22	2.11	2.19
50	6.8	7.2	8.1	7.5	6.5	7.1	7.8	8.5	9.2	9.2	8.3	7.3	8.0
	2.30	2.43	2.40	2.32	2.38	2.31	2.28	2.31	2.37	2.41	2.28	2.16	2.24
100	7.4	7.8	8.8	8.2	7.1	7.7	8.5	9.2	9.9	9.9	9.0	8.0	8.7
	2.23	2.35	2.32	2.24	2.31	2.23	2.21	2.24	2.30	2.33	2.21	2.09	2.18
200	8.2	8.7	9.7	9.0	7.8	8.6	9.4	10.2	11.0	11.0	10.0	8.8	9.6
	2.11	2.22	2.20	2.13	2.19	2.12	2.09	2.12	2.18	2.21	2.09	1.98	2.07
Freq	7.7	7.7	8.4	6.4	4.7	5.4	7.3	10.1	11.2	10.8	10.9	9.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.4	5.0	4.2	3.8	4.4	4.7	5.1	5.5	5.4	4.7	4.2	4.7
	1.90	1.94	1.92	1.85	1.89	1.84	1.79	1.85	1.91	1.90	1.77	1.69	1.80
25	4.8	5.3	5.9	5.0	4.6	5.2	5.6	6.1	6.6	6.4	5.7	5.0	5.7
	2.05	2.10	2.07	1.99	2.05	1.99	1.94	1.99	2.06	2.05	1.91	1.83	1.94
50	5.6	6.1	6.9	5.8	5.3	6.1	6.5	7.1	7.7	7.4	6.6	5.8	6.6
	2.31	2.36	2.33	2.24	2.30	2.23	2.17	2.24	2.31	2.31	2.15	2.05	2.17
100	6.7	7.3	8.2	6.9	6.3	7.2	7.7	8.4	9.1	8.8	7.8	6.9	7.8
	2.46	2.51	2.48	2.39	2.45	2.38	2.31	2.39	2.46	2.45	2.28	2.19	2.30
200	8.3	9.0	10.2	8.6	7.9	8.9	9.5	10.5	11.3	11.0	9.7	8.6	9.7
	2.35	2.40	2.37	2.28	2.33	2.27	2.21	2.28	2.35	2.35	2.18	2.09	2.20
Freq	7.4	7.9	8.6	5.5	4.7	5.7	7.8	10.9	11.1	10.7	11.1	8.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.9	4.3	3.5	3.3	3.8	4.1	4.5	4.8	4.7	4.1	3.6	4.1
	1.94	1.97	1.90	1.85	1.89	1.86	1.80	1.85	1.91	1.92	1.77	1.71	1.80
25	4.4	4.8	5.4	4.3	4.1	4.8	5.1	5.5	6.0	5.8	5.1	4.5	5.1
	2.07	2.10	2.04	1.98	2.03	1.99	1.93	1.98	2.04	2.05	1.89	1.83	1.92
50	5.1	5.6	6.3	5.1	4.8	5.6	5.9	6.5	7.0	6.8	6.0	5.3	6.0
	2.30	2.33	2.26	2.19	2.24	2.20	2.13	2.19	2.26	2.27	2.09	2.03	2.12
100	6.1	6.7	7.5	6.1	5.7	6.7	7.1	7.8	8.4	8.1	7.1	6.3	7.1
	2.52	2.56	2.48	2.40	2.46	2.42	2.35	2.40	2.48	2.49	2.30	2.23	2.31
200	7.5	8.3	9.2	7.5	7.1	8.2	8.7	9.6	10.4	10.0	8.8	7.8	8.8
	2.42	2.45	2.37	2.30	2.36	2.31	2.24	2.30	2.38	2.38	2.20	2.13	2.22
Freq	7.3	8.0	8.6	5.2	4.6	5.8	8.0	11.2	11.1	10.7	11.2	8.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.1	3.4	2.8	2.7	3.1	3.3	3.6	3.8	3.6	3.2	2.9	3.3
	1.97	1.96	1.89	1.90	1.89	1.84	1.80	1.87	1.92	1.92	1.75	1.75	1.81
25	3.7	4.1	4.5	3.6	3.5	4.0	4.3	4.7	5.0	4.8	4.2	3.8	4.3
	2.09	2.08	2.00	2.01	2.00	1.95	1.91	1.98	2.03	2.03	1.86	1.85	1.92
50	4.5	4.9	5.4	4.4	4.3	4.9	5.2	5.7	6.1	5.8	5.1	4.6	5.2
	2.27	2.26	2.17	2.19	2.17	2.12	2.07	2.15	2.21	2.21	2.01	2.01	2.08
100	5.4	5.9	6.5	5.3	5.1	5.9	6.3	6.8	7.3	7.0	6.1	5.5	6.3
	2.59	2.58	2.47	2.49	2.48	2.42	2.36	2.45	2.51	2.51	2.30	2.29	2.35
200	6.6	7.3	8.0	6.4	6.3	7.2	7.7	8.4	8.9	8.5	7.5	6.8	7.7
	2.49	2.48	2.38	2.40	2.38	2.33	2.28	2.37	2.42	2.42	2.21	2.20	2.27
Freq	7.3	7.9	8.5	5.0	4.7	6.2	8.3	11.2	11.1	10.8	10.9	8.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	240	4.2	97	3.7	64	2.9	31
25	6.6	306	5.0	153	4.5	112	3.8	67
50	7.1	371	5.8	213	5.3	165	4.6	109
100	7.7	486	6.9	339	6.3	260	5.6	173
200	8.5	689	8.6	678	7.8	505	6.8	324

Gourdon

44° 45′ 00″ N 01° 24′ 00″ E	UTM 31 E 373342 m N 4956516 m	261 m a.s.l.

Location in SW France at the W extremity of the Massif Central. The site, which is not in an airport, is situated 1500 m NE of the centre of the city of Gourdon. The terrain is undulating and densely forested. The small scattered areas of farmland have many shelterbelts. There are obstacles - trees and houses - at approx. 50 m to 150 m from the anemometer in the sectors SW, NW and N.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30												
30	0.30												
60	0.30												
90	0.30												
120	0.30												
150	0.30												
180	0.30												
210	0.30												
240	0.30												
270	0.30												
300	0.30												
330	0.30												

Height of anemometer: 11.0 m a.g.l. Period: 70010103–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	7.7	189	282	245	132	75	42	21	10	3	1	0	0	0	0	2.7	1.54
30	4.3	242	283	243	109	65	39	12	4	2	2	0	0	0	0	2.4	1.49
60	2.8	293	283	226	103	52	30	11	0	0	0	0	0	0	0	2.2	1.49
90	4.9	222	288	251	122	62	28	19	3	1	1	2	0	0	0	2.5	1.50
120	12.6	121	223	240	159	92	64	36	23	16	17	5	4	2	0	3.3	1.28
150	10.9	141	215	191	122	96	69	44	34	24	32	19	9	6	0	3.7	1.17
180	7.7	160	222	206	153	128	71	28	15	10	6	0	0	0	0	3.2	1.61
210	7.7	155	205	221	173	127	71	29	11	3	5	0	0	0	0	3.3	1.74
240	8.3	137	223	218	160	119	75	35	15	10	7	0	0	0	0	3.3	1.61
270	11.4	133	217	227	172	110	72	37	20	6	4	2	0	0	0	3.3	1.62
300	11.8	133	253	264	168	93	48	20	10	5	3	2	0	0	0	3.0	1.61
330	9.9	158	279	274	143	80	41	14	6	2	1	0	0	0	0	2.7	1.69
Total	100.0	157	241	234	149	96	58	28	15	8	8	3	1	1	0	3.1	1.37

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.0	3.4	3.0	2.7	2.6	2.1	1.9	1.9	2.0	2.5	2.6	2.8	2.5
3	2.9	3.2	2.8	2.4	2.4	1.9	1.7	1.8	2.0	2.3	2.6	2.8	2.4
6	2.9	3.1	2.6	2.4	2.2	1.6	1.5	1.6	1.7	2.1	2.5	2.6	2.2
9	3.0	3.4	3.1	3.5	3.1	2.4	2.2	2.2	2.2	2.4	2.6	2.6	2.7
12	3.5	4.1	3.8	4.0	3.5	3.0	2.9	2.8	2.9	3.1	3.2	3.2	3.3
15	3.4	4.1	4.1	4.2	3.6	3.2	3.2	3.0	2.9	3.1	3.2	3.0	3.4
18	3.2	3.5	3.3	3.6	3.3	3.0	3.0	2.7	2.2	2.3	2.8	2.9	3.0
21	3.3	3.5	3.1	2.9	2.7	2.1	2.1	2.0	2.3	2.5	2.8	3.0	2.7
Day	3.1	3.5	3.2	3.2	2.9	2.4	2.3	2.2	2.3	2.5	2.8	2.9	2.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.9	4.5	4.7	6.2	6.6	6.6	6.3	6.4	6.5	6.0	5.5	5.9
	1.87	1.76	1.75	1.75	1.42	1.27	1.43	1.97	1.96	1.92	1.87	1.92	1.55
25	5.7	5.4	4.9	5.2	6.8	7.3	7.2	6.8	7.0	7.1	6.6	6.0	6.5
	1.93	1.81	1.81	1.80	1.46	1.29	1.46	2.03	2.01	1.98	1.92	1.98	1.59
50	6.1	5.8	5.3	5.6	7.3	7.8	7.7	7.4	7.5	7.6	7.1	6.5	7.0
	1.98	1.86	1.85	1.85	1.49	1.31	1.49	2.09	2.07	2.04	1.98	2.04	1.63
100	6.6	6.3	5.7	6.1	7.8	8.3	8.3	8.0	8.1	8.2	7.7	7.0	7.5
	1.92	1.80	1.79	1.79	1.46	1.30	1.47	2.02	2.00	1.97	1.91	1.97	1.60
200	7.3	6.9	6.3	6.7	8.4	8.8	8.9	8.8	9.0	9.1	8.5	7.7	8.2
	1.81	1.71	1.70	1.70	1.40	1.27	1.42	1.92	1.90	1.87	1.81	1.87	1.55
Freq	8.7	5.9	3.5	3.9	9.2	11.7	9.1	7.7	8.0	10.0	11.6	10.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.3	3.0	3.3	4.3	4.8	4.4	4.3	4.4	4.4	4.1	3.7	4.1
	1.54	1.47	1.49	1.47	1.25	1.16	1.37	1.69	1.60	1.59	1.57	1.63	1.35
25	4.3	4.0	3.7	4.0	5.2	5.7	5.3	5.2	5.3	5.3	4.9	4.5	4.9
	1.66	1.59	1.60	1.59	1.31	1.19	1.46	1.82	1.73	1.72	1.69	1.76	1.43
50	5.0	4.7	4.3	4.7	6.0	6.4	6.2	6.1	6.1	6.2	5.7	5.2	5.7
	1.86	1.78	1.80	1.78	1.42	1.24	1.62	2.04	1.94	1.93	1.90	1.98	1.56
100	6.0	5.6	5.1	5.6	7.0	7.3	7.3	7.2	7.3	7.3	6.8	6.2	6.8
	1.98	1.89	1.92	1.89	1.52	1.32	1.73	2.17	2.06	2.05	2.03	2.11	1.69
200	7.4	6.9	6.3	6.9	8.3	8.4	9.0	8.9	9.1	9.1	8.4	7.7	8.3
	1.89	1.81	1.83	1.81	1.46	1.29	1.66	2.08	1.97	1.96	1.93	2.01	1.67
Freq	8.1	5.0	3.1	4.5	11.1	11.3	8.3	7.7	8.2	10.8	11.7	10.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.9	2.6	2.9	3.9	4.3	3.9	3.8	3.9	3.9	3.5	3.2	3.6
	1.52	1.48	1.49	1.48	1.29	1.17	1.49	1.73	1.64	1.63	1.60	1.64	1.37
25	3.9	3.6	3.3	3.6	4.8	5.2	4.8	4.7	4.8	4.8	4.4	4.0	4.5
	1.63	1.58	1.60	1.58	1.35	1.19	1.60	1.85	1.75	1.75	1.71	1.75	1.44
50	4.6	4.3	3.9	4.3	5.7	6.0	5.7	5.6	5.7	5.7	5.2	4.7	5.3
	1.80	1.75	1.76	1.75	1.45	1.23	1.76	2.05	1.94	1.93	1.89	1.94	1.56
100	5.5	5.1	4.6	5.1	6.7	6.9	6.8	6.6	6.8	6.8	6.2	5.6	6.3
	1.98	1.92	1.94	1.92	1.58	1.31	1.94	2.25	2.13	2.12	2.08	2.13	1.72
200	6.8	6.3	5.7	6.3	7.9	7.9	8.4	8.2	8.4	8.4	7.6	6.9	7.6
	1.90	1.84	1.85	1.83	1.53	1.30	1.85	2.15	2.04	2.03	1.99	2.04	1.70
Freq	7.9	4.7	3.0	4.7	11.8	11.1	8.0	7.7	8.2	11.1	11.7	10.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.3	2.1	2.4	3.1	3.4	3.0	3.0	3.1	3.1	2.8	2.5	2.8
	1.52	1.46	1.48	1.44	1.27	1.18	1.62	1.73	1.62	1.63	1.62	1.67	1.38
25	3.3	3.0	2.7	3.1	4.0	4.4	4.0	4.0	4.0	4.0	3.7	3.4	3.8
	1.62	1.54	1.56	1.52	1.32	1.20	1.71	1.83	1.72	1.72	1.71	1.77	1.44
50	4.0	3.6	3.3	3.8	4.9	5.3	4.8	4.8	4.9	4.9	4.5	4.1	4.6
	1.75	1.67	1.70	1.65	1.40	1.23	1.86	1.99	1.87	1.87	1.86	1.92	1.53
100	4.8	4.4	4.0	4.6	5.8	6.2	5.8	5.8	5.9	5.9	5.4	4.9	5.5
	1.99	1.90	1.93	1.87	1.53	1.29	2.12	2.27	2.12	2.13	2.12	2.19	1.70
200	5.9	5.4	4.9	5.7	6.9	7.2	7.1	7.1	7.3	7.3	6.6	6.0	6.7
	1.92	1.84	1.87	1.80	1.52	1.32	2.04	2.19	2.05	2.05	2.04	2.11	1.71
Freq	7.6	4.3	2.9	5.1	12.6	10.8	7.7	7.7	8.4	11.4	11.8	9.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.3	240	3.8	104	3.3	69	2.6	33
25	5.8	304	4.5	160	4.1	117	3.4	70
50	6.3	362	5.1	212	4.7	166	4.1	111
100	6.8	466	6.0	309	5.6	241	4.9	166
200	7.4	646	7.4	579	6.8	442	5.9	292

Istres

43° 31′ 00″ N	04° 56′ 00″ E	UTM 31	E 656264 m	N 4820095 m	24 m a.s.l.

Located in the Rhône valley in southern France, about 40 km WNW of the city of Marseille. The village of Istres is 5 km to the E of the site and the sea 10 km to the S. The landscape is flat and open with large cultivated and built-up areas in the NE to S sectors and several large water areas appearing from E through S to W. The anemometer is placed between runways with no obstacles closer than 400 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1100	0.20	3000	0.05								
30	0.01	1100	0.05	3000	0.20								
60	0.01	1100	0.30										
90	0.01	500	0.15	1750	0.40								
120	0.01	1600	0.30										
150	0.01	1700	0.15										
180	0.01	3500	0.15	4500	0.50								
210	0.01												
240	0.01												
270	0.01												
300	0.01												
330	0.01												

Height of anemometer: 10.0 m a.g.l. Period: 70111200-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	19.2	61	40	75	93	79	81	78	74	76	121	94	60	39	29	8.6	1.81
30	10.8	31	132	238	240	148	87	40	23	19	19	10	7	3	4	4.0	1.31
60	6.9	42	217	316	233	119	47	16	4	4	2	2	0	0	0	3.3	1.95
90	7.9	34	125	209	201	126	106	72	45	30	32	15	4	0	0	4.5	1.57
120	7.1	31	79	142	162	119	108	91	80	56	89	31	9	4	0	5.9	1.77
150	4.7	27	90	131	99	91	92	99	93	87	127	42	16	3	0	6.8	2.09
180	4.7	20	77	97	124	163	160	130	97	60	54	12	5	1	0	6.0	2.33
210	3.5	21	84	128	181	174	175	123	70	29	7	6	1	0	0	5.2	2.50
240	3.1	30	117	173	191	163	131	105	43	30	13	2	1	0	0	4.7	2.12
270	5.1	27	95	152	164	153	123	87	79	44	56	16	2	1	0	5.3	1.86
300	9.7	20	70	110	152	151	133	111	80	55	70	28	14	4	1	6.0	1.85
330	17.4	14	40	68	85	98	87	88	88	80	128	92	63	35	31	8.8	1.89
Total	100.0	32	85	139	148	120	101	81	66	54	75	45	27	15	11	6.1	1.45

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.6	5.3	5.0	5.1	4.0	4.1	4.7	4.2	4.3	4.6	5.3	5.1	4.8
3	5.6	5.3	5.0	4.9	4.0	4.0	4.6	4.2	4.3	4.9	5.2	5.2	4.8
6	5.7	5.4	5.1	4.9	4.2	4.5	4.9	4.5	4.3	5.1	5.4	5.4	4.9
9	6.0	6.2	6.5	6.9	5.5	5.7	6.1	5.7	5.4	6.0	6.1	5.6	6.0
12	6.8	7.3	7.3	7.7	6.7	6.6	7.0	6.9	6.3	6.6	6.9	6.4	6.9
15	6.8	7.3	7.6	8.4	7.1	7.1	7.9	7.6	6.8	6.7	6.6	6.2	7.2
18	5.7	6.2	6.2	6.8	6.1	6.5	6.9	6.4	5.4	5.0	5.6	5.5	6.0
21	5.4	5.7	5.4	5.7	4.2	4.4	4.9	4.4	4.3	4.7	5.5	5.4	5.0
Day	5.9	6.1	6.0	6.3	5.2	5.4	5.9	5.5	5.1	5.4	5.8	5.6	5.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	11.6	7.3	5.4	6.5	8.1	9.2	8.8	7.3	6.3	6.9	7.8	10.6	8.6
	1.95	1.31	1.85	1.76	1.93	2.21	2.56	2.72	2.64	2.23	2.19	1.96	1.67
25	12.7	7.9	5.9	7.2	8.9	10.0	9.6	8.0	6.9	7.5	8.6	11.5	9.4
	1.96	1.33	1.91	1.81	1.98	2.26	2.64	2.81	2.73	2.30	2.26	1.99	1.69
50	13.5	8.5	6.3	7.7	9.5	10.7	10.3	8.6	7.4	8.1	9.2	12.3	10.0
	1.99	1.35	1.96	1.86	2.03	2.33	2.71	2.88	2.80	2.37	2.32	2.02	1.73
100	14.3	9.0	6.9	8.4	10.2	11.5	11.1	9.3	8.1	8.8	10.0	13.1	10.8
	1.99	1.34	1.90	1.80	1.98	2.27	2.63	2.80	2.71	2.29	2.25	2.01	1.73
200	15.3	9.6	7.6	9.2	11.1	12.5	12.3	10.3	8.9	9.7	11.0	14.0	11.7
	1.96	1.31	1.79	1.71	1.90	2.19	2.49	2.65	2.56	2.17	2.13	1.97	1.71
Freq	18.5	12.9	8.0	7.7	7.4	5.4	4.7	3.8	3.2	4.5	8.4	15.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.4	4.1	3.5	4.9	6.0	6.7	6.0	4.8	4.3	4.9	5.5	7.9	6.1
	1.81	1.23	1.83	1.58	1.74	2.06	2.29	2.41	2.12	1.88	1.84	1.88	1.54
25	9.9	4.9	4.2	5.9	7.1	7.9	7.1	5.8	5.2	5.8	6.6	9.3	7.2
	1.84	1.29	1.98	1.70	1.84	2.17	2.47	2.60	2.29	2.03	1.99	1.93	1.61
50	11.0	5.7	4.8	6.9	8.1	9.0	8.2	6.6	6.0	6.8	7.6	10.4	8.3
	1.90	1.40	2.22	1.90	2.00	2.35	2.78	2.93	2.57	2.28	2.24	2.01	1.71
100	12.3	6.7	5.8	8.2	9.4	10.4	9.7	7.8	7.1	8.0	9.1	11.7	9.5
	2.01	1.51	2.36	2.02	2.14	2.52	2.96	3.12	2.74	2.43	2.38	2.15	1.84
200	13.8	8.0	7.2	10.1	11.2	12.5	12.1	9.8	8.8	10.0	11.3	13.4	11.3
	1.98	1.45	2.26	1.93	2.06	2.43	2.83	2.97	2.62	2.31	2.28	2.10	1.87
Freq	19.0	11.1	7.0	7.8	7.2	4.8	4.7	3.6	3.1	5.0	9.5	17.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.3	3.6	3.1	4.3	5.3	5.8	5.1	4.1	3.8	4.3	4.9	7.0	5.3
	1.78	1.38	1.85	1.56	1.78	2.07	2.30	2.45	2.08	1.84	1.77	1.90	1.56
25	8.8	4.5	3.8	5.4	6.5	7.2	6.3	5.1	4.7	5.3	6.1	8.4	6.5
	1.81	1.48	1.99	1.66	1.87	2.17	2.47	2.62	2.22	1.97	1.88	1.94	1.62
50	10.0	5.4	4.5	6.3	7.5	8.3	7.4	5.9	5.5	6.2	7.1	9.6	7.6
	1.86	1.63	2.20	1.82	2.01	2.32	2.73	2.90	2.46	2.18	2.05	2.01	1.71
100	11.3	6.4	5.3	7.5	8.8	9.6	8.8	7.1	6.5	7.4	8.4	10.9	8.8
	1.95	1.78	2.41	2.00	2.20	2.55	3.00	3.19	2.70	2.40	2.25	2.13	1.84
200	12.8	7.9	6.6	9.2	10.5	11.5	10.9	8.7	8.1	9.1	10.2	12.5	10.5
	1.96	1.71	2.31	1.92	2.12	2.46	2.87	3.05	2.59	2.30	2.16	2.12	1.89
Freq	18.8	10.6	6.9	7.9	7.0	4.7	4.7	3.5	3.2	5.3	10.1	17.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	2.8	2.6	3.5	4.2	4.5	4.0	3.2	3.1	3.5	4.1	5.5	4.2
	1.70	1.40	1.71	1.60	1.82	2.06	2.28	2.41	2.01	1.86	1.72	1.88	1.57
25	7.1	3.8	3.4	4.6	5.5	5.9	5.2	4.2	4.0	4.6	5.4	7.1	5.5
	1.73	1.49	1.81	1.69	1.89	2.15	2.42	2.55	2.13	1.97	1.78	1.92	1.62
50	8.3	4.6	4.1	5.6	6.6	7.1	6.3	5.1	4.9	5.5	6.5	8.4	6.6
	1.77	1.62	1.97	1.81	2.01	2.28	2.62	2.77	2.32	2.14	1.88	1.97	1.69
100	9.7	5.6	5.0	6.8	7.8	8.4	7.5	6.1	5.8	6.6	7.7	9.8	7.8
	1.84	1.83	2.24	2.06	2.22	2.52	2.99	3.16	2.64	2.44	2.06	2.07	1.81
200	11.2	6.8	6.1	8.2	9.3	10.0	9.2	7.5	7.2	8.1	9.1	11.3	9.2
	1.88	1.77	2.17	1.99	2.19	2.49	2.88	3.05	2.55	2.35	2.05	2.11	1.87
Freq	17.9	10.1	7.0	7.8	6.7	4.7	4.5	3.4	3.5	5.9	10.9	17.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.7	650	5.5	264	4.8	174	3.8	83
25	8.4	828	6.5	412	5.9	301	4.9	177
50	8.9	983	7.4	558	6.8	431	5.9	284
100	9.6	1214	8.5	774	7.8	615	6.9	429
200	10.4	1564	10.0	1260	9.3	992	8.2	689

Le Puy Chadrac

45° 03′ 00″ N	03° 54′ 00″ E	UTM 31	E 570875 m	N 4988991 m	715 m a.s.l.

Location in the central part of the Massif Central in the valley of the River Loire and at the outskirts of the city of Le Puy. The terrain is undulating and 15% forested. Built-up areas encroach on the site from N to W. The terrain slopes down to the river Borne from N to W, the steepest slope being 100 m in 400 m from E to SW.
The anemometer is situated very close to the NW wall of the meteorological station building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	300	0.15									19	7
30	0.03	300	0.25									36	5
60	0.30											46	-1
90	0.30											36	-7
120	0.30											19	-6
150	0.30											13	2
180	0.30											25	7
210	0.40											44	5
240	0.40											49	-1
270	0.30											36	-7
300	0.03	1500	0.15									13	-5
330	0.03	1300	0.15									8	1

Height of anemometer: 14.9 m a.g.l. Period: 76010103-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	12.2	278	156	148	129	112	69	47	27	16	15	2	0	0	0	3.3	1.39
30	9.9	313	167	141	141	101	67	33	18	10	7	0	0	0	0	3.0	1.40
60	6.4	490	236	110	67	45	31	15	2	1	3	0	0	0	0	1.6	1.02
90	5.2	596	246	116	22	13	8	0	0	0	0	0	0	0	0	1.1	1.12
120	4.3	604	157	93	63	25	30	15	6	2	3	1	1	0	0	1.3	0.83
150	7.2	350	114	84	68	71	72	53	52	30	48	26	16	9	7	4.1	1.09
180	10.1	262	106	93	73	75	69	76	59	41	67	45	22	9	4	5.1	1.30
210	9.3	364	179	110	72	65	66	49	40	21	25	6	1	2	1	2.8	1.04
240	9.2	360	207	146	76	62	54	38	25	15	10	4	3	0	1	2.5	1.03
270	7.9	374	194	149	101	74	47	25	22	7	6	1	1	0	0	2.4	1.15
300	8.6	342	181	172	117	83	58	24	11	5	6	1	1	0	0	2.6	1.28
330	9.7	284	188	149	121	97	68	45	21	12	14	2	0	0	0	3.0	1.32
Total	100.0	358	174	129	94	75	57	39	26	15	19	8	4	2	1	2.8	1.04

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.0	1.9	2.2	1.9	1.4	1.6	1.3	1.4	1.7	2.2	1.9	2.7	1.8
3	1.7	1.9	1.9	1.4	1.2	1.3	1.0	1.1	1.5	2.0	1.8	2.3	1.6
6	1.8	1.9	1.8	1.4	1.2	1.2	1.0	1.0	1.4	2.0	1.8	2.4	1.6
9	2.0	2.2	2.5	2.6	2.7	2.7	2.3	2.0	2.1	2.5	2.0	2.6	2.4
12	3.0	3.3	4.2	4.3	4.2	4.0	3.7	3.4	3.5	3.8	2.9	3.7	3.7
15	3.0	3.7	4.5	4.9	4.8	4.4	4.2	4.0	4.1	4.1	3.2	3.5	4.0
18	2.2	2.7	3.4	3.7	3.9	4.2	3.9	3.5	3.2	2.8	2.6	2.8	3.2
21	2.0	2.1	2.4	2.3	2.0	2.1	2.1	2.0	2.1	2.2	2.3	3.0	2.2
Day	2.2	2.5	2.9	2.8	2.7	2.7	2.4	2.3	2.4	2.7	2.3	2.9	2.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.8	2.7	1.8	1.9	4.7	6.5	4.9	3.3	3.2	3.3	3.8	3.7
	1.59	1.58	1.34	1.20	1.02	0.98	1.28	1.21	1.17	1.25	1.40	1.48	1.09
25	4.6	4.2	3.0	2.0	2.1	5.2	7.1	5.4	3.7	3.5	3.6	4.2	4.1
	1.64	1.62	1.38	1.23	1.06	0.98	1.30	1.24	1.20	1.28	1.44	1.52	1.11
50	5.0	4.5	3.3	2.2	2.2	5.5	7.6	5.8	4.0	3.8	3.9	4.5	4.4
	1.68	1.67	1.42	1.26	1.08	1.00	1.33	1.27	1.23	1.31	1.48	1.57	1.13
100	5.4	4.9	3.5	2.3	2.4	5.9	8.1	6.3	4.3	4.1	4.2	4.9	4.8
	1.63	1.62	1.37	1.23	1.05	0.99	1.31	1.24	1.19	1.27	1.43	1.52	1.12
200	5.9	5.4	3.8	2.5	2.6	6.3	8.7	6.8	4.6	4.5	4.6	5.3	5.2
	1.54	1.53	1.30	1.16	1.00	0.98	1.28	1.19	1.13	1.21	1.36	1.44	1.10
Freq	12.2	10.3	6.5	5.0	5.0	7.4	10.0	9.0	7.6	7.4	8.7	10.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.5	1.6	1.1	1.2	4.1	4.6	2.8	2.2	2.2	2.3	2.7	2.6
	1.35	1.33	1.07	1.02	0.84	1.02	1.19	1.02	1.01	1.08	1.21	1.28	0.98
25	3.5	3.0	2.0	1.4	1.5	4.8	5.4	3.5	2.7	2.6	2.8	3.3	3.1
	1.46	1.43	1.15	1.09	0.90	1.04	1.23	1.09	1.08	1.16	1.30	1.38	1.03
50	4.1	3.6	2.3	1.7	1.9	5.4	6.2	4.2	3.2	3.1	3.2	3.9	3.7
	1.63	1.60	1.28	1.22	1.00	1.08	1.30	1.22	1.21	1.29	1.46	1.54	1.10
100	4.9	4.3	2.8	2.0	2.3	6.2	7.1	5.0	3.8	3.8	3.9	4.7	4.4
	1.74	1.70	1.36	1.29	1.06	1.14	1.40	1.29	1.28	1.37	1.54	1.64	1.19
200	6.1	5.3	3.5	2.5	2.8	7.0	8.3	6.2	4.7	4.6	4.8	5.8	5.3
	1.66	1.63	1.30	1.24	1.01	1.12	1.35	1.24	1.23	1.31	1.48	1.57	1.19
Freq	12.4	9.2	5.7	4.9	5.0	8.3	10.4	8.4	7.5	7.5	9.2	11.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	2.2	1.3	1.0	1.1	3.8	4.0	2.3	1.9	1.9	2.0	2.4	2.3
	1.36	1.33	1.05	1.02	0.84	1.06	1.21	1.02	1.00	1.10	1.22	1.29	0.99
25	3.2	2.7	1.7	1.3	1.4	4.6	4.9	3.0	2.3	2.4	2.5	3.0	2.8
	1.46	1.42	1.12	1.08	0.89	1.08	1.24	1.09	1.06	1.17	1.30	1.38	1.03
50	3.8	3.2	2.0	1.5	1.7	5.3	5.7	3.6	2.8	2.9	3.0	3.6	3.3
	1.60	1.57	1.23	1.19	0.98	1.11	1.31	1.20	1.17	1.29	1.43	1.53	1.09
100	4.5	3.8	2.4	1.8	2.1	6.1	6.6	4.3	3.5	3.5	3.6	4.3	4.0
	1.76	1.72	1.35	1.30	1.06	1.18	1.42	1.31	1.28	1.41	1.57	1.67	1.19
200	5.6	4.7	3.0	2.2	2.6	6.9	7.7	5.3	4.2	4.3	4.4	5.3	4.9
	1.69	1.65	1.29	1.25	1.02	1.17	1.38	1.26	1.23	1.35	1.51	1.60	1.19
Freq	12.5	8.8	5.4	4.9	5.0	8.6	10.5	8.2	7.4	7.5	9.4	11.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	1.7	0.9	0.9	0.9	3.1	3.1	1.8	1.5	1.5	1.6	2.0	1.8
	1.37	1.33	0.98	1.12	0.80	1.10	1.21	1.05	1.06	1.14	1.26	1.31	1.00
25	2.7	2.2	1.2	1.2	1.3	4.0	4.1	2.3	2.0	2.1	2.2	2.6	2.4
	1.44	1.41	1.04	1.18	0.84	1.12	1.24	1.11	1.12	1.21	1.33	1.38	1.04
50	3.3	2.7	1.5	1.4	1.6	4.8	4.9	2.9	2.5	2.5	2.6	3.2	2.9
	1.56	1.53	1.12	1.27	0.90	1.15	1.30	1.19	1.21	1.31	1.44	1.50	1.09
100	4.0	3.3	1.9	1.8	2.0	5.7	5.8	3.6	3.1	3.1	3.2	3.9	3.6
	1.78	1.74	1.26	1.44	1.01	1.21	1.40	1.35	1.37	1.48	1.63	1.71	1.18
200	4.8	4.0	2.3	2.1	2.5	6.6	6.8	4.3	3.8	3.8	3.9	4.7	4.3
	1.72	1.68	1.22	1.39	0.98	1.23	1.40	1.30	1.31	1.43	1.57	1.65	1.21
Freq	12.4	8.2	5.1	4.8	5.2	9.2	10.6	7.9	7.3	7.7	9.7	11.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	3.6	143	2.6	66	2.3	43	1.8	21
25	4.0	180	3.1	99	2.8	73	2.4	43
50	4.2	212	3.5	127	3.2	100	2.8	67
100	4.6	270	4.1	175	3.8	138	3.4	97
200	5.0	369	5.0	315	4.6	241	4.1	163

Limoges

45° 52′ 00″ N	01° 11′ 00″ E	UTM 31	E 358987 m	N 5080934 m	402 m a.s.l.

Located in the SW of France on the Plateau du Limousin at the western border of the Massif Central. The site at the aerodrome is 8 km NW of the centre of the city of Limoges. The landscape is characterized by close vegetation such as small woods, many hedges and scattered trees in a rolling terrain. There are no obstacles in the immediate vicinity of the anemometer.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.30										
30	0.01	350	0.25										
60	0.01	100	0.30										
90	0.01	100	0.25										
120	0.01	100	0.15	2000	0.25								
150	0.01	150	0.15	2000	0.20								
180	0.01	250	0.25										
210	0.01	600	0.05	2500	0.25								
240	0.01	1000	0.20										
270	0.01	350	0.15										
300	0.01	250	0.15										
330	0.01	400	0.30										

Height of anemometer: 11.0 m a.g.l. Period: 73010100–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	10.0	91	167	236	209	154	90	34	14	3	1	0	0	0	0	3.6	2.10
30	13.2	96	186	221	177	135	94	53	19	11	5	2	0	0	0	3.7	1.79
60	9.9	126	229	243	176	113	65	31	10	5	1	0	0	0	0	3.2	1.76
90	7.2	181	270	256	150	86	41	14	2	1	0	0	0	0	0	2.7	1.75
120	4.2	217	324	268	116	41	19	11	4	0	0	0	0	0	0	2.3	1.64
150	6.6	177	286	270	145	60	33	15	5	6	2	0	0	0	0	2.7	1.59
180	8.1	126	249	246	168	117	51	25	10	5	2	0	0	0	0	3.1	1.72
210	9.2	100	171	238	201	126	78	45	26	8	6	1	0	0	0	3.6	1.79
240	8.5	77	107	178	170	153	131	83	50	25	19	6	1	1	0	4.6	1.89
270	9.3	82	92	190	188	168	116	76	43	27	13	5	1	1	0	4.5	1.90
300	8.3	79	126	228	231	167	81	42	29	8	4	4	1	0	0	3.9	1.93
330	5.4	104	154	262	235	135	63	25	15	3	4	1	0	0	0	3.5	2.00
Total	100.0	114	188	232	183	127	77	41	20	9	5	2	0	0	0	3.5	1.70

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.1	3.2	3.4	3.0	2.5	2.5	2.5	2.2	2.1	2.4	2.8	3.2	2.7
3	3.0	3.2	3.2	2.8	2.1	2.2	2.0	1.9	2.0	2.5	2.8	3.1	2.6
6	3.0	3.2	3.1	2.8	2.2	2.2	1.9	1.7	1.9	2.4	2.7	3.1	2.5
9	3.1	3.5	3.9	3.7	3.0	3.1	2.8	2.7	2.7	2.9	2.9	3.3	3.1
12	3.8	4.4	4.7	4.4	3.8	3.5	3.4	3.3	3.5	3.6	3.9	3.8	3.8
15	3.9	4.4	4.9	4.8	3.8	3.9	3.6	3.6	3.4	3.4	3.7	3.7	3.9
18	3.3	3.4	4.0	4.0	3.4	3.5	3.3	2.9	2.4	2.5	3.0	3.3	3.3
21	3.2	3.4	3.4	3.1	2.6	2.6	2.6	2.5	2.3	2.6	2.9	3.4	2.9
Day	3.3	3.6	3.8	3.6	2.9	2.9	2.8	2.6	2.5	2.8	3.1	3.4	3.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	5.9	6.0	5.5	4.5	4.5	5.0	5.3	6.1	6.9	6.6	5.9	5.8
	2.46	2.19	2.06	2.02	1.95	1.85	1.94	2.07	2.07	2.24	2.22	2.29	2.05
25	6.2	6.5	6.6	6.0	4.9	4.9	5.5	5.8	6.7	7.6	7.2	6.5	6.3
	2.54	2.26	2.13	2.08	2.01	1.91	2.00	2.13	2.13	2.31	2.30	2.36	2.11
50	6.7	6.9	7.1	6.5	5.3	5.3	5.9	6.2	7.2	8.2	7.8	7.0	6.8
	2.60	2.32	2.19	2.13	2.06	1.96	2.05	2.19	2.19	2.37	2.36	2.42	2.16
100	7.3	7.5	7.6	7.0	5.8	5.7	6.4	6.8	7.8	8.9	8.4	7.6	7.3
	2.52	2.24	2.12	2.07	1.99	1.90	1.99	2.12	2.12	2.30	2.28	2.35	2.10
200	8.0	8.3	8.4	7.7	6.3	6.3	7.0	7.4	8.6	9.8	9.3	8.4	8.1
	2.39	2.12	2.01	1.96	1.89	1.80	1.88	2.01	2.01	2.18	2.16	2.22	1.99
Freq	8.1	11.9	11.1	8.3	5.5	5.6	7.5	8.9	8.9	8.9	8.6	6.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.2	4.2	3.6	3.0	3.2	3.6	3.7	4.5	4.9	4.5	4.0	4.0
	2.05	1.79	1.74	1.70	1.62	1.55	1.68	1.76	1.80	1.88	1.88	1.94	1.74
25	4.8	5.0	5.1	4.4	3.6	3.8	4.3	4.4	5.4	5.8	5.4	4.8	4.8
	2.22	1.94	1.87	1.83	1.75	1.68	1.81	1.90	1.94	2.03	2.03	2.09	1.87
50	5.5	5.8	5.9	5.1	4.2	4.4	5.0	5.2	6.3	6.8	6.3	5.6	5.6
	2.49	2.18	2.10	2.06	1.97	1.88	2.04	2.13	2.18	2.28	2.28	2.35	2.09
100	6.5	6.9	7.0	6.0	5.0	5.3	5.9	6.1	7.5	8.0	7.4	6.6	6.6
	2.66	2.32	2.24	2.19	2.10	2.00	2.17	2.27	2.33	2.43	2.43	2.51	2.22
200	8.1	8.5	8.6	7.5	6.2	6.5	7.4	7.6	9.3	10.0	9.2	8.3	8.3
	2.54	2.21	2.14	2.10	2.00	1.91	2.08	2.17	2.22	2.32	2.32	2.39	2.12
Freq	9.3	12.7	10.3	7.7	4.7	6.2	7.9	9.2	8.7	9.1	8.4	5.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.6	3.7	3.1	2.5	2.8	3.1	3.2	4.1	4.3	3.9	3.5	3.5
	2.04	1.77	1.76	1.69	1.60	1.55	1.67	1.76	1.87	1.88	1.91	1.95	1.74
25	4.3	4.5	4.6	3.8	3.1	3.4	3.9	4.0	5.0	5.3	4.8	4.3	4.3
	2.18	1.90	1.88	1.81	1.71	1.66	1.79	1.88	1.99	2.01	2.04	2.08	1.86
50	5.0	5.3	5.4	4.5	3.7	4.1	4.6	4.7	5.9	6.2	5.7	5.0	5.1
	2.42	2.10	2.08	2.01	1.90	1.84	1.98	2.08	2.21	2.22	2.26	2.31	2.04
100	5.9	6.3	6.4	5.4	4.4	4.8	5.5	5.6	7.0	7.4	6.7	5.9	6.1
	2.65	2.31	2.29	2.20	2.08	2.02	2.17	2.28	2.43	2.44	2.48	2.53	2.23
200	7.3	7.8	7.9	6.7	5.4	6.0	6.7	6.9	8.7	9.1	8.3	7.3	7.5
	2.54	2.21	2.19	2.11	1.99	1.93	2.08	2.19	2.32	2.34	2.38	2.42	2.14
Freq	9.8	13.0	9.9	7.4	4.5	6.4	8.0	9.3	8.6	9.2	8.3	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.9	2.9	2.4	2.0	2.2	2.5	2.6	3.3	3.3	3.0	2.7	2.8
	2.04	1.79	1.76	1.71	1.62	1.56	1.75	1.79	1.88	1.87	1.90	1.99	1.76
25	3.6	3.8	3.8	3.2	2.6	2.9	3.3	3.5	4.3	4.4	4.0	3.6	3.7
	2.17	1.90	1.86	1.81	1.71	1.65	1.85	1.90	1.99	1.98	2.02	2.12	1.86
50	4.4	4.6	4.7	3.8	3.2	3.5	4.1	4.2	5.2	5.3	4.8	4.3	4.4
	2.35	2.06	2.02	1.96	1.86	1.79	2.01	2.06	2.17	2.15	2.19	2.30	2.01
100	5.3	5.6	5.6	4.6	3.9	4.3	4.9	5.1	6.2	6.4	5.8	5.2	5.4
	2.68	2.35	2.30	2.24	2.12	2.03	2.29	2.35	2.47	2.45	2.49	2.62	2.27
200	6.4	6.8	6.9	5.7	4.7	5.3	6.0	6.2	7.6	7.8	7.1	6.3	6.5
	2.58	2.26	2.22	2.15	2.04	1.96	2.21	2.26	2.38	2.36	2.40	2.52	2.19
Freq	10.2	12.8	9.8	7.1	4.4	6.7	8.3	9.1	8.5	9.2	8.1	5.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.1	151	3.6	62	3.1	41	2.5	20
25	5.6	193	4.3	98	3.9	72	3.3	43
50	6.0	234	5.0	136	4.5	105	3.9	70
100	6.5	307	5.9	216	5.4	165	4.7	111
200	7.2	436	7.3	432	6.6	322	5.8	207

Lorient

47° 46 ′ 00″ N	03° 27 ′ 00″ W	UTM 30	E 466279 m	N 5290567 m	44 m a.s.l.

Location on the S coast of Brittany, 5 km W of the city of Lorient. Shortest distance to the coast is 5 km in the SW direction. The terrain is undulating and is characterized by many small forests and villages - and farmland with shelterbelts.
The anemometer is located N of the runways with no obstruction closer than 250 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	200	0.30										
30	0.01	200	0.15	500	0.03	1500	0.30						
60	0.01	1100	0.30										
90	0.01	1200	0.30										
120	0.01	700	0.30										
150	0.01	700	0.30										
180	0.01	600	0.30										
210	0.01	650	0.30										
240	0.01	1100	0.20										
270	0.01	500	0.30										
300	0.01	300	0.30										
330	0.01	200	0.30										

Height of anemometer: 10.0 m a.g.l. Period: 70010103-78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.9	44	141	244	232	145	78	63	27	13	10	2	0	0	0	4.0	1.85
30	10.9	30	85	185	184	165	116	87	60	36	41	9	1	0	0	4.9	1.87
60	10.6	22	70	161	193	161	139	99	67	46	39	2	0	0	0	5.2	2.12
90	7.0	43	89	148	195	178	140	95	62	29	17	4	0	0	0	4.9	2.19
120	4.3	54	97	147	154	140	140	118	78	38	32	3	0	0	0	5.2	2.18
150	3.5	68	72	134	133	148	125	107	77	62	60	15	0	0	0	5.6	2.03
180	4.0	50	72	128	139	140	123	98	87	71	60	22	8	3	0	5.8	1.91
210	6.7	36	45	79	109	142	136	126	103	84	87	35	16	2	0	6.7	2.17
240	12.1	22	49	85	108	128	139	137	105	81	89	36	15	3	1	6.8	2.22
270	16.1	29	80	128	148	151	131	106	88	54	57	16	7	2	1	5.7	1.94
300	9.7	45	133	222	179	130	104	65	51	34	28	7	1	1	0	4.4	1.63
330	7.0	63	159	267	218	117	79	44	27	17	7	1	1	0	0	3.7	1.72
Total	100.0	37	89	159	166	146	121	96	70	47	45	13	5	1	0	5.3	1.85

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.7	4.1	4.1	3.7	3.6	3.3	3.6	3.6	3.7	4.6	5.0	4.1
3	4.9	4.7	4.1	4.1	3.7	3.4	3.3	3.4	3.6	3.8	4.5	5.0	4.0
6	5.0	4.7	4.2	4.1	3.8	3.5	3.3	3.3	3.5	3.8	4.3	5.0	4.0
9	5.0	4.6	5.0	5.6	5.2	4.8	4.4	4.5	4.6	4.4	4.6	5.2	4.8
12	5.8	6.0	6.2	6.4	6.1	5.6	5.4	5.2	5.6	5.4	5.6	5.8	5.8
15	5.7	6.1	6.2	6.5	6.3	6.0	5.9	5.8	5.6	5.3	5.5	5.5	5.9
18	4.8	4.9	4.8	5.6	5.4	5.4	5.1	4.9	4.2	3.7	4.4	5.0	4.9
21	4.8	4.7	4.2	4.2	3.8	3.9	3.6	3.6	3.7	3.6	4.6	5.1	4.2
Day	5.1	5.1	4.8	5.1	4.8	4.5	4.3	4.3	4.3	4.2	4.8	5.2	4.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.0	7.9	7.9	7.5	7.6	8.3	8.9	9.9	10.0	9.4	8.2	7.0	8.3
	2.11	2.15	2.37	2.52	2.52	2.45	2.22	2.37	2.50	2.33	2.07	1.94	2.18
25	7.6	8.6	8.7	8.2	8.3	9.1	9.7	10.8	10.9	10.2	9.0	7.7	9.1
	2.18	2.22	2.44	2.60	2.60	2.53	2.28	2.41	2.55	2.38	2.13	2.00	2.23
50	8.2	9.3	9.3	8.8	8.9	9.8	10.4	11.6	11.6	10.9	9.6	8.2	9.8
	2.23	2.28	2.51	2.67	2.67	2.60	2.34	2.48	2.62	2.44	2.19	2.05	2.29
100	8.9	10.1	10.1	9.5	9.6	10.6	11.1	12.4	12.5	11.8	10.4	8.9	10.5
	2.16	2.21	2.43	2.58	2.58	2.51	2.28	2.43	2.56	2.39	2.13	1.99	2.24
200	9.8	11.1	11.2	10.5	10.6	11.7	12.2	13.5	13.6	12.8	11.4	9.8	11.6
	2.05	2.10	2.30	2.45	2.45	2.38	2.19	2.35	2.47	2.30	2.03	1.88	2.16
Freq	7.6	9.8	10.8	8.5	5.4	3.8	3.8	5.7	10.0	14.3	12.2	8.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	5.6	5.5	5.2	5.4	5.9	6.3	7.2	7.0	6.4	5.4	4.7	5.8
	1.80	1.83	2.04	2.13	2.12	2.03	1.92	2.13	2.19	1.97	1.69	1.66	1.88
25	5.9	6.7	6.5	6.2	6.5	7.1	7.5	8.5	8.3	7.6	6.5	5.7	7.0
	1.95	1.96	2.20	2.30	2.30	2.19	2.02	2.24	2.30	2.08	1.81	1.79	2.00
50	6.8	7.8	7.6	7.1	7.5	8.2	8.5	9.6	9.4	8.7	7.5	6.6	8.0
	2.19	2.19	2.47	2.59	2.58	2.46	2.20	2.40	2.49	2.26	2.01	2.02	2.20
100	8.1	9.2	8.9	8.4	8.9	9.7	9.9	11.0	10.9	10.1	8.8	7.8	9.4
	2.33	2.33	2.63	2.76	2.74	2.62	2.36	2.58	2.67	2.42	2.15	2.15	2.36
200	10.1	11.3	11.1	10.5	11.1	12.0	11.9	13.0	12.9	12.1	10.8	9.8	11.4
	2.22	2.23	2.52	2.63	2.62	2.50	2.28	2.49	2.58	2.33	2.06	2.05	2.29
Freq	7.8	10.5	10.8	7.6	4.7	3.6	3.9	6.3	11.3	15.4	10.7	7.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	5.0	4.7	4.5	4.8	5.2	5.5	6.3	6.1	5.6	4.6	4.1	5.1
	1.80	1.85	2.08	2.14	2.13	2.03	1.90	2.15	2.20	1.94	1.66	1.68	1.88
25	5.3	6.1	5.8	5.5	5.9	6.4	6.7	7.7	7.4	6.8	5.7	5.1	6.3
	1.93	1.98	2.23	2.29	2.28	2.17	1.99	2.24	2.31	2.03	1.77	1.79	1.99
50	6.2	7.2	6.8	6.4	6.9	7.5	7.8	8.8	8.6	7.9	6.7	6.0	7.3
	2.13	2.17	2.47	2.54	2.53	2.39	2.14	2.37	2.47	2.19	1.94	1.99	2.16
100	7.4	8.5	8.1	7.7	8.3	8.9	9.1	10.2	10.0	9.2	7.9	7.1	8.6
	2.35	2.38	2.71	2.79	2.78	2.62	2.35	2.60	2.71	2.40	2.13	2.18	2.37
200	9.2	10.4	10.1	9.5	10.2	10.9	10.9	12.0	11.9	11.0	9.7	8.8	10.4
	2.24	2.29	2.59	2.67	2.66	2.51	2.27	2.52	2.62	2.31	2.04	2.09	2.31
Freq	7.8	10.8	10.8	7.3	4.5	3.6	4.0	6.5	11.8	15.7	10.1	7.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.9	3.7	3.5	3.8	4.1	4.4	4.9	4.7	4.3	3.5	3.2	4.0
	1.85	1.88	2.12	2.17	2.15	2.03	1.93	2.17	2.19	1.94	1.65	1.71	1.90
25	4.5	5.2	4.9	4.6	5.0	5.4	5.7	6.4	6.2	5.7	4.7	4.2	5.3
	1.96	1.99	2.24	2.30	2.28	2.15	2.01	2.25	2.28	2.02	1.75	1.81	1.99
50	5.5	6.2	5.9	5.6	6.1	6.5	6.9	7.6	7.4	6.8	5.7	5.1	6.3
	2.12	2.15	2.44	2.50	2.48	2.32	2.13	2.37	2.41	2.14	1.89	1.97	2.13
100	6.6	7.5	7.1	6.7	7.3	7.8	8.1	9.0	8.7	8.1	6.8	6.2	7.6
	2.42	2.44	2.78	2.85	2.83	2.63	2.35	2.58	2.66	2.38	2.15	2.24	2.38
200	8.1	9.1	8.7	8.2	8.9	9.5	9.7	10.7	10.4	9.6	8.3	7.6	9.1
	2.33	2.35	2.68	2.75	2.72	2.54	2.32	2.58	2.63	2.34	2.07	2.16	2.35
Freq	8.1	11.0	10.4	6.8	4.3	3.5	4.2	7.1	12.3	15.7	9.5	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	434	5.2	173	4.5	114	3.6	55
25	8.1	555	6.2	274	5.5	200	4.7	119
50	8.7	669	7.1	379	6.5	293	5.6	193
100	9.3	859	8.3	576	7.6	444	6.7	301
200	10.3	1174	10.1	1069	9.2	809	8.1	536

Lyon

45° 43′ 00″ N 04° 57′ 00″ E	UTM 31 E 651768 m N 5064512 m	201 m a.s.l.

Location in the Rhône valley at the E side of the city of Lyon. The surroundings and the airport itself are relatively open and flat out to approximately 2.5 km. The landscape is dominated by the city and its suburbs. The anemometer is placed SW of the runways with buildings in the NE, SW and W sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	2250	0.25									-1	
30	0.01	1000	0.07	2200	0.25							-11	
60	0.01	750	0.07	1500	0.30							-8	
90	0.01	750	0.07	1400	0.30								
120	0.01	600	0.15	1400	0.35								
150	0.01	600	0.07	2000	0.20								
180	0.01	200	0.07	1500	0.40							-12	
210	0.01	200	0.05	2000	0.40							-24	
240	0.01	200	0.05	1750	0.10	3000	0.40					-23	
270	0.01	200	0.20	2000	0.60							-7	
300	0.01	250	0.25	2500	0.60							-7	
330	0.01	300	0.25	800	0.05	2000	0.60					-4	

Height of anemometer: 12.0 m a.g.l. Period: 70041900-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	20.1	109	125	164	171	133	106	73	51	29	26	9	1	1	0	4.4	1.67
30	7.9	255	236	216	145	72	39	17	12	4	1	0	0	0	0	2.6	1.50
60	4.2	441	281	179	76	16	7	1	0	0	0	0	0	0	0	1.6	1.42
90	5.0	404	276	209	72	27	10	1	0	0	0	0	0	0	0	1.8	1.48
120	6.2	331	282	205	108	53	17	3	1	0	0	0	0	0	0	2.1	1.50
150	9.0	237	237	193	122	98	56	29	14	7	6	0	0	0	0	2.8	1.40
180	15.1	142	143	117	109	103	97	78	66	47	59	28	7	2	0	5.1	1.55
210	7.1	274	211	145	84	71	59	46	37	27	27	13	4	1	0	3.0	1.08
240	3.2	465	247	153	60	39	17	11	9	0	1	0	0	0	0	1.7	1.10
270	3.0	542	167	148	69	40	21	6	4	2	1	0	0	0	0	1.5	1.05
300	5.1	293	173	181	154	98	52	30	12	6	2	0	0	0	0	2.9	1.51
330	14.1	123	120	165	182	162	103	58	45	22	17	3	1	0	0	4.3	1.84
Total	100.0	227	183	168	130	97	68	44	32	19	19	7	2	1	0	3.4	1.29

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.9	2.9	3.1	2.9	2.4	2.1	2.1	1.9	2.1	2.1	2.7	2.5	2.4
3	2.7	2.8	2.7	2.5	2.1	1.9	1.7	1.5	1.9	1.9	2.8	2.4	2.2
6	2.6	2.7	2.6	2.5	2.2	2.0	1.9	1.6	1.8	1.9	2.6	2.3	2.2
9	2.8	3.2	3.4	3.7	3.4	3.1	3.1	2.7	2.9	2.7	2.9	2.6	3.0
12	3.6	4.1	4.4	4.9	4.2	3.8	3.7	3.8	3.9	3.7	3.8	3.3	3.9
15	3.6	4.2	4.8	5.1	4.3	4.2	4.2	4.1	4.2	3.9	3.7	3.1	4.1
18	3.1	3.5	3.8	4.4	3.8	3.8	4.2	3.6	3.2	2.8	3.1	2.8	3.5
21	2.9	3.0	3.3	3.4	2.9	2.6	2.5	2.3	2.5	2.4	3.0	2.6	2.8
Day	3.0	3.3	3.5	3.7	3.1	2.9	2.9	2.7	2.8	2.7	3.1	2.7	3.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	5.4	3.5	2.7	3.0	3.8	7.5	7.9	4.8	3.3	4.8	7.1	5.6
	2.05	1.83	1.60	1.69	1.73	1.61	1.41	1.44	1.07	1.26	1.56	2.07	1.36
25	7.3	6.0	3.8	2.9	3.3	4.2	8.2	8.6	5.2	3.6	5.2	7.8	6.2
	2.11	1.89	1.65	1.75	1.78	1.66	1.42	1.45	1.08	1.29	1.61	2.13	1.38
50	7.9	6.4	4.2	3.1	3.5	4.5	8.8	9.2	5.6	3.9	5.6	8.4	6.6
	2.17	1.94	1.69	1.79	1.83	1.70	1.45	1.48	1.11	1.33	1.65	2.19	1.41
100	8.6	7.0	4.5	3.4	3.8	4.9	9.3	9.8	5.9	4.2	6.1	9.1	7.1
	2.10	1.88	1.64	1.74	1.77	1.65	1.44	1.47	1.09	1.29	1.60	2.12	1.40
200	9.4	7.7	4.9	3.7	4.2	5.4	10.0	10.5	6.4	4.6	6.7	10.0	7.8
	1.99	1.78	1.55	1.65	1.68	1.56	1.41	1.44	1.06	1.22	1.52	2.01	1.38
Freq	17.7	12.8	5.8	4.7	5.7	7.8	12.6	10.4	4.9	3.1	4.2	10.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	3.3	2.1	1.8	2.1	2.8	6.1	5.0	2.8	2.1	3.5	5.1	3.9
	1.67	1.47	1.31	1.44	1.44	1.37	1.44	1.20	0.95	1.05	1.41	1.78	1.22
25	5.3	4.0	2.6	2.2	2.6	3.4	7.2	5.9	3.4	2.6	4.3	6.1	4.7
	1.80	1.58	1.41	1.54	1.55	1.48	1.48	1.23	1.00	1.12	1.52	1.92	1.28
50	6.2	4.7	3.0	2.6	3.0	3.9	8.1	6.7	4.0	3.1	5.0	7.0	5.4
	2.02	1.77	1.58	1.74	1.74	1.66	1.54	1.28	1.08	1.26	1.71	2.16	1.37
100	7.4	5.6	3.6	3.1	3.6	4.7	9.2	7.7	4.7	3.7	6.0	8.4	6.4
	2.15	1.89	1.68	1.85	1.85	1.76	1.65	1.37	1.16	1.33	1.82	2.30	1.47
200	9.2	7.0	4.4	3.8	4.4	5.8	10.6	8.7	5.6	4.6	7.4	10.4	7.8
	2.06	1.80	1.61	1.76	1.76	1.69	1.61	1.33	1.12	1.27	1.74	2.20	1.48
Freq	19.4	9.7	4.9	4.9	6.0	8.6	13.9	8.4	4.0	3.0	4.7	12.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	2.8	1.7	1.6	1.9	2.5	5.6	4.1	2.3	1.9	3.2	4.4	3.4
	1.69	1.48	1.35	1.44	1.47	1.39	1.50	1.14	0.99	1.06	1.44	1.78	1.23
25	4.8	3.4	2.2	2.0	2.4	3.1	6.8	5.0	2.9	2.4	4.0	5.5	4.2
	1.81	1.58	1.44	1.54	1.57	1.48	1.54	1.17	1.06	1.13	1.54	1.91	1.28
50	5.6	4.0	2.6	2.4	2.8	3.7	7.7	5.8	3.5	2.8	4.7	6.4	5.0
	2.00	1.74	1.59	1.70	1.74	1.64	1.60	1.21	1.16	1.24	1.71	2.11	1.36
100	6.7	4.8	3.1	2.9	3.4	4.4	8.9	6.7	4.3	3.5	5.6	7.7	5.9
	2.20	1.91	1.75	1.86	1.91	1.80	1.71	1.28	1.27	1.35	1.87	2.32	1.47
200	8.3	6.0	3.8	3.5	4.2	5.4	10.2	7.6	5.3	4.2	6.9	9.5	7.2
	2.10	1.83	1.67	1.78	1.83	1.72	1.69	1.27	1.22	1.30	1.79	2.22	1.49
Freq	20.0	8.6	4.5	5.0	6.1	8.8	14.4	7.7	3.6	3.0	4.9	13.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	2.0	1.3	1.3	1.6	2.1	4.5	3.0	1.6	1.5	2.7	3.5	2.7
	1.69	1.47	1.41	1.46	1.49	1.24	1.54	1.07	1.10	1.05	1.51	1.78	1.24
25	4.0	2.7	1.7	1.7	2.1	2.7	5.8	3.8	2.2	2.0	3.5	4.6	3.6
	1.79	1.55	1.49	1.54	1.57	1.31	1.57	1.09	1.15	1.11	1.60	1.89	1.28
50	4.8	3.3	2.1	2.1	2.6	3.3	6.9	4.6	2.7	2.5	4.3	5.5	4.3
	1.94	1.69	1.62	1.68	1.71	1.42	1.62	1.12	1.25	1.20	1.74	2.05	1.35
100	5.8	4.0	2.5	2.6	3.1	4.1	8.1	5.4	3.3	3.1	5.2	6.7	5.2
	2.21	1.92	1.84	1.91	1.94	1.62	1.72	1.17	1.42	1.36	1.98	2.34	1.46
200	7.1	4.8	3.1	3.1	3.8	5.0	9.4	6.3	4.0	3.7	6.4	8.1	6.3
	2.13	1.85	1.77	1.84	1.87	1.56	1.75	1.20	1.37	1.31	1.91	2.26	1.49
Freq	19.2	7.7	4.3	5.1	6.4	8.9	14.7	7.0	3.2	3.1	5.6	14.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.1	265	3.6	114	3.2	75	2.5	36
25	5.6	336	4.3	175	3.9	128	3.3	76
50	6.0	398	5.0	233	4.5	182	3.9	121
100	6.5	504	5.8	331	5.4	261	4.7	182
200	7.1	679	7.0	588	6.5	454	5.7	307

Millau

44° 07′ 00″ N	03° 01′ 00″ E	UTM 31	E 501333 m	N 4884920 m	720 m a.s.l.

Located in the S part of the Massif Central in the valley of the river Tarn and 6 km NW of the city of Millau. The terrain in the sectors SW to NE is rather complicated with steep escarpments rising from the bottom of the valley. Generally, the terrain has a complicated appearance with many elevation changes and many wooded areas.
The anemometer is situated on top of a hill close to the N and W slopes. These slopes fall about 150 m in 500 m. The hill runs SW-NE with the SW slope 2.5 km away. To the E the slope is not so steep but it is on average 80 m in 1000 m. At the site there are buildings between 40 and 70 m from the anemometer in the E sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.25											60	-7
30	0.25											41	-5
60	0.20											35	3
90	0.05	100	0.20	200	0.07	1800	0.25					30	6
120	0.07	2500	0.30									56	4
150	0.07	2000	0.25									60	-2
180	0.07	900	0.30									49	-6
210	0.07	500	0.30									36	-5
240	0.20											35	3
270	0.20											50	7
300	0.20											67	4
330	0.20											70	-2

Height of anemometer: 10.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	15.2	33	56	75	81	84	101	109	120	107	131	61	26	11	4	7.8	2.31
30	11.5	64	126	138	120	101	88	76	74	63	82	37	20	7	5	5.9	1.54
60	8.8	85	191	232	150	106	66	53	40	30	31	13	4	0	0	3.9	1.34
90	3.9	140	259	262	163	81	41	20	17	5	10	0	1	1	0	3.0	1.42
120	5.4	83	159	176	153	106	79	55	38	44	56	27	12	6	8	4.6	1.23
150	10.4	38	69	97	98	125	106	105	94	70	112	50	17	11	8	7.0	1.85
180	7.8	47	75	89	94	101	121	111	94	82	101	43	23	9	10	7.0	1.86
210	3.6	116	178	180	186	117	81	39	41	26	24	8	2	1	2	3.9	1.41
240	5.3	75	180	230	204	145	82	41	21	12	7	2	1	2	0	3.8	1.71
270	6.5	66	143	159	161	126	113	73	63	40	33	14	5	3	1	4.8	1.61
300	8.4	47	76	108	101	101	121	111	82	72	100	43	23	8	6	6.7	1.85
330	13.3	30	45	54	73	92	104	114	118	106	141	74	26	11	11	8.1	2.25
Total	100.0	58	109	130	118	104	96	86	79	67	86	39	17	7	5	6.1	1.65

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.3	5.7	5.5	5.8	4.7	4.2	4.2	3.9	4.2	4.7	4.7	5.0	4.8
3	5.4	5.8	5.4	5.5	4.5	3.9	3.9	4.0	4.0	4.7	4.6	4.7	4.7
6	4.7	5.9	5.1	5.3	4.5	3.8	3.6	3.4	3.8	4.5	4.6	4.7	4.5
9	4.8	6.0	5.6	6.5	5.6	4.8	4.5	4.3	4.3	4.8	4.5	4.8	5.0
12	5.3	6.9	7.0	7.8	6.7	5.9	5.8	5.8	5.4	6.3	5.4	5.4	6.2
15	6.0	7.4	7.7	8.1	7.1	6.5	6.6	6.5	6.1	6.6	6.0	5.8	6.7
18	5.4	6.5	6.8	7.4	6.5	6.2	6.2	5.9	5.4	5.6	5.3	5.4	6.0
21	5.3	6.2	6.1	6.1	5.2	5.0	5.0	4.7	4.7	5.0	5.0	5.1	5.3
Day	5.3	6.3	6.2	6.5	5.6	5.0	5.0	4.8	4.7	5.3	5.0	5.1	5.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	8.9	6.8	4.8	4.8	6.8	7.7	7.1	5.6	5.9	7.1	8.4	7.3
	2.66	2.18	1.63	1.46	1.44	1.99	2.17	1.91	1.75	1.82	2.07	2.51	1.90
25	10.0	9.8	7.4	5.3	5.3	7.4	8.4	7.8	6.1	6.5	7.8	9.2	8.0
	2.74	2.22	1.67	1.51	1.48	2.06	2.24	1.97	1.80	1.88	2.14	2.59	1.95
50	10.7	10.4	8.0	5.8	5.7	8.0	9.1	8.4	6.6	7.0	8.4	9.9	8.6
	2.81	2.29	1.72	1.54	1.52	2.11	2.30	2.02	1.85	1.93	2.19	2.66	2.00
100	11.6	11.2	8.6	6.2	6.2	8.7	9.8	9.1	7.2	7.6	9.1	10.7	9.3
	2.73	2.24	1.67	1.50	1.47	2.05	2.22	1.96	1.79	1.87	2.13	2.57	1.95
200	12.8	12.3	9.4	6.8	6.8	9.6	10.9	10.1	7.9	8.4	10.0	11.9	10.2
	2.60	2.15	1.60	1.42	1.39	1.94	2.10	1.85	1.70	1.77	2.01	2.44	1.87
Freq	12.7	13.8	11.4	6.7	4.7	7.3	8.1	5.9	5.7	6.9	7.3	9.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.5	6.1	4.1	3.1	3.4	4.9	5.5	4.5	3.8	4.3	5.1	6.0	5.1
	2.26	1.76	1.32	1.20	1.24	1.78	1.83	1.47	1.55	1.57	1.81	2.19	1.65
25	7.7	7.3	5.0	3.8	4.2	5.9	6.6	5.5	4.6	5.2	6.1	7.2	6.1
	2.42	1.85	1.42	1.29	1.34	1.92	1.98	1.58	1.67	1.69	1.95	2.36	1.76
50	8.8	8.3	5.8	4.5	4.9	6.8	7.6	6.4	5.3	6.0	7.1	8.3	7.1
	2.69	2.00	1.59	1.44	1.50	2.17	2.23	1.77	1.88	1.90	2.19	2.65	1.93
100	10.4	9.6	6.9	5.3	5.9	8.1	9.1	7.6	6.3	7.2	8.4	9.8	8.3
	2.87	2.15	1.69	1.53	1.60	2.30	2.37	1.89	2.00	2.03	2.34	2.83	2.06
200	12.8	11.4	8.6	6.6	7.3	10.1	11.3	9.4	7.8	8.9	10.5	12.2	10.3
	2.75	2.07	1.62	1.47	1.52	2.20	2.26	1.81	1.91	1.94	2.23	2.70	1.99
Freq	13.5	13.8	10.5	5.3	4.9	8.2	7.8	5.2	6.1	7.0	7.4	10.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	5.3	3.4	2.7	3.0	4.3	4.8	3.8	3.3	3.8	4.5	5.3	4.4
	2.28	1.72	1.32	1.24	1.26	1.82	1.85	1.42	1.58	1.58	1.83	2.20	1.65
25	6.9	6.4	4.3	3.4	3.8	5.4	6.0	4.7	4.0	4.7	5.6	6.5	5.5
	2.42	1.79	1.41	1.32	1.34	1.95	1.98	1.52	1.69	1.69	1.96	2.36	1.75
50	8.1	7.5	5.1	4.1	4.5	6.3	7.0	5.6	4.8	5.6	6.5	7.6	6.4
	2.64	1.92	1.56	1.46	1.48	2.16	2.19	1.68	1.86	1.87	2.17	2.62	1.90
100	9.5	8.7	6.1	4.9	5.4	7.5	8.4	6.7	5.7	6.7	7.8	9.0	7.6
	2.90	2.10	1.71	1.60	1.62	2.37	2.40	1.84	2.05	2.06	2.38	2.87	2.07
200	11.6	10.3	7.5	6.0	6.7	9.3	10.3	8.3	7.0	8.2	9.6	11.2	9.3
	2.79	2.03	1.64	1.53	1.55	2.27	2.30	1.76	1.96	1.97	2.28	2.75	2.01
Freq	13.7	13.9	10.1	4.7	4.9	8.5	7.7	5.0	6.3	7.1	7.4	10.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.1	2.6	2.0	2.6	3.5	3.8	2.9	2.6	3.1	3.7	4.2	3.5
	2.25	1.67	1.35	1.18	1.35	1.84	1.85	1.41	1.63	1.63	1.90	2.22	1.67
25	5.8	5.3	3.4	2.7	3.4	4.6	5.0	3.8	3.4	4.1	4.8	5.5	4.6
	2.37	1.74	1.42	1.25	1.43	1.96	1.96	1.49	1.73	1.73	2.01	2.35	1.75
50	7.0	6.3	4.2	3.3	4.2	5.5	6.1	4.7	4.2	5.0	5.8	6.6	5.6
	2.55	1.83	1.54	1.35	1.55	2.12	2.12	1.62	1.88	1.88	2.19	2.56	1.87
100	8.3	7.5	5.1	4.1	5.1	6.7	7.3	5.7	5.0	6.0	7.0	7.9	6.7
	2.88	2.01	1.75	1.53	1.76	2.42	2.42	1.84	2.13	2.13	2.49	2.91	2.08
200	10.1	9.0	6.2	5.0	6.2	8.1	8.9	7.0	6.2	7.3	8.6	9.7	8.1
	2.79	2.00	1.69	1.48	1.70	2.33	2.33	1.77	2.06	2.06	2.40	2.81	2.04
Freq	13.9	13.9	9.6	4.4	5.2	8.5	7.5	4.9	6.6	7.1	7.6	10.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.5	337	4.6	137	4.0	90	3.1	44
25	7.1	431	5.4	215	4.9	158	4.1	94
50	7.6	519	6.3	297	5.7	229	4.9	152
100	8.3	674	7.4	458	6.8	351	5.9	236
200	9.1	939	9.1	886	8.3	662	7.2	431

Mont Aigoual

44° 07′ 00″ N 03° 35′ 00″ E	UTM 31 E 546678 m N 4885085 m	1565 m a.s.l.

Location on the summit of Aigoual in the SE part of the Massif Central. The terrain appears complicated in all sectors. The plateau at the summit, where the site is located, runs E-W. The steepest slope is to the S - approx. 600 m in 1000 m. To the NE the slope is approx. 200 m over 750 m. The area is covered by forests.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	240	0.10									201	5
30	0.03	200	0.10									186	-13
60	0.03	240	0.10									109	-26
90	0.05	250	0.10									24	-12
120	0.05	200	0.10									58	24
150	0.05	100	0.10									153	21
180	0.05	100	0.10									206	5
210	0.03	200	0.10									186	-13
240	0.03	300	0.10									108	-25
270	0.03	1000	0.10									23	-11
300	0.03	1000	0.10									54	23
330	0.03	500	0.10									145	21

Height of anemometer: 11.5 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	18.4	18	13	24	28	34	40	46	37	49	88	97	90	104	333	16.0	2.32
30	3.6	102	40	91	80	94	83	82	66	51	94	55	38	36	87	7.9	1.29
60	1.6	280	50	100	113	106	89	50	85	46	48	16	14	4	2	4.8	1.39
90	1.4	331	48	115	120	107	74	81	31	31	38	16	10	0	0	4.1	1.34
120	1.5	258	43	101	74	92	87	78	74	49	58	35	29	11	8	5.7	1.28
150	8.8	43	20	34	38	37	52	52	50	49	107	97	96	67	254	14.1	1.66
180	18.6	23	19	34	47	55	50	59	47	54	102	87	80	76	270	14.3	1.61
210	3.3	132	48	84	102	98	80	79	78	52	81	56	24	20	63	7.2	1.15
240	2.1	195	55	98	97	82	82	72	68	48	87	38	38	13	30	6.3	1.31
270	3.3	148	36	68	69	69	72	65	50	56	107	79	45	44	93	8.9	1.37
300	13.0	33	17	34	37	42	49	55	51	49	119	99	80	93	242	13.8	1.95
330	24.4	19	9	19	20	24	34	38	42	43	97	106	110	121	317	16.1	2.54
Total	100.0	50	20	38	42	46	49	53	48	49	97	90	82	85	252	13.9	1.80

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	14.5	15.6	13.5	13.3	11.9	10.4	10.4	10.1	10.7	12.6	13.2	13.3	12.4
3	14.5	15.5	13.3	13.4	11.9	10.1	10.4	10.0	10.9	12.5	13.2	13.1	12.4
6	15.4	16.2	13.7	13.8	11.6	9.8	10.5	10.3	10.7	13.1	13.7	13.9	12.7
9	14.9	15.7	12.8	12.3	10.4	8.1	8.3	8.3	8.9	11.9	13.0	13.8	11.5
12	14.7	15.2	12.6	11.9	10.3	8.2	8.5	8.2	8.4	11.6	11.9	13.3	11.2
15	14.5	14.8	12.6	12.0	10.6	8.7	8.7	8.9	8.8	11.1	12.1	13.3	11.3
18	15.4	15.5	13.2	12.5	10.7	9.1	9.3	9.2	10.0	12.3	13.2	13.9	12.0
21	15.2	15.3	14.0	13.5	11.7	10.2	10.2	10.0	10.7	12.8	13.4	13.4	12.5
Day	14.9	15.5	13.2	12.8	11.1	9.3	9.5	9.4	9.9	12.2	12.9	13.5	12.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.0	7.8	6.3	5.8	11.4	9.6	7.9	6.9	5.8	10.7	14.1	11.6	10.4
	2.68	2.37	1.65	1.52	1.45	1.57	1.80	1.68	1.40	1.39	2.31	2.12	1.69
25	9.8	8.6	6.9	6.4	12.4	10.5	8.6	7.6	6.3	11.7	15.4	12.6	11.3
	2.76	2.45	1.71	1.56	1.45	1.59	1.84	1.73	1.44	1.39	2.33	2.14	1.71
50	10.5	9.2	7.5	6.9	13.2	11.2	9.2	8.1	6.8	12.4	16.3	13.4	12.1
	2.84	2.51	1.75	1.61	1.46	1.61	1.89	1.77	1.48	1.40	2.35	2.18	1.73
100	11.4	10.0	8.1	7.5	13.9	11.9	9.9	8.8	7.3	13.2	17.3	14.3	12.9
	2.75	2.43	1.69	1.56	1.47	1.61	1.85	1.73	1.44	1.41	2.36	2.17	1.74
200	12.6	11.1	8.9	8.2	14.8	12.7	10.8	9.6	7.9	13.9	18.5	15.3	13.8
	2.61	2.30	1.60	1.48	1.46	1.58	1.77	1.65	1.38	1.40	2.33	2.13	1.73
Freq	10.1	5.0	3.1	2.6	6.3	9.7	8.8	5.0	3.1	5.6	21.5	19.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.9	5.2	4.0	4.0	8.8	6.4	5.3	4.6	3.7	8.4	10.3	7.5	7.4
	2.26	1.82	1.27	1.31	1.47	1.54	1.59	1.37	1.18	1.44	2.26	2.10	1.58
25	7.1	6.3	4.8	4.9	10.2	7.6	6.3	5.5	4.5	9.8	11.9	8.8	8.7
	2.44	1.96	1.37	1.41	1.48	1.60	1.69	1.46	1.26	1.46	2.30	2.18	1.63
50	8.2	7.3	5.6	5.7	11.3	8.6	7.3	6.4	5.3	10.9	13.3	9.9	9.8
	2.75	2.20	1.52	1.58	1.51	1.67	1.86	1.60	1.38	1.48	2.35	2.31	1.70
100	9.7	8.6	6.7	6.8	12.6	9.7	8.5	7.5	6.3	12.1	14.8	11.3	11.2
	2.93	2.35	1.62	1.68	1.55	1.79	1.99	1.71	1.48	1.52	2.46	2.49	1.81
200	12.1	10.8	8.3	8.5	13.9	11.1	10.3	9.1	7.6	13.4	16.5	13.2	12.9
	2.80	2.24	1.55	1.60	1.56	1.74	1.91	1.64	1.42	1.53	2.45	2.41	1.86
Freq	8.6	4.0	2.9	2.6	7.4	10.4	8.2	3.9	2.9	6.5	26.3	16.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	4.5	3.3	3.5	7.7	5.4	4.5	4.0	3.2	7.5	8.9	6.1	6.5
	2.28	1.77	1.24	1.31	1.49	1.59	1.59	1.36	1.17	1.48	2.28	2.28	1.59
25	6.3	5.6	4.2	4.4	9.2	6.6	5.6	4.9	4.0	9.1	10.7	7.5	7.9
	2.44	1.89	1.33	1.40	1.50	1.64	1.69	1.43	1.24	1.49	2.31	2.39	1.63
50	7.3	6.6	5.0	5.2	10.5	7.6	6.6	5.8	4.7	10.3	12.1	8.6	9.0
	2.70	2.09	1.46	1.54	1.52	1.72	1.84	1.55	1.35	1.52	2.36	2.56	1.69
100	8.7	7.8	6.0	6.3	11.8	8.8	7.8	6.9	5.7	11.6	13.7	10.1	10.4
	2.96	2.30	1.60	1.70	1.56	1.87	2.02	1.70	1.48	1.56	2.46	2.81	1.80
200	10.8	9.6	7.4	7.7	13.2	10.3	9.4	8.3	6.9	12.9	15.4	12.0	12.1
	2.83	2.20	1.53	1.62	1.59	1.82	1.94	1.63	1.42	1.58	2.48	2.72	1.87
Freq	7.8	3.7	2.9	2.6	8.0	10.6	7.8	3.6	2.9	6.9	28.3	15.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	3.5	2.7	3.3	5.8	4.2	3.5	3.1	2.8	6.2	6.8	4.7	5.1
	2.26	1.71	1.27	1.15	1.46	1.61	1.59	1.34	1.05	1.65	2.22	2.36	1.59
25	5.2	4.6	3.6	4.3	7.4	5.5	4.7	4.1	3.7	8.0	8.8	6.1	6.6
	2.40	1.81	1.35	1.18	1.48	1.66	1.67	1.40	1.08	1.66	2.25	2.47	1.63
50	6.3	5.5	4.4	5.1	8.7	6.5	5.7	4.9	4.4	9.4	10.3	7.3	7.8
	2.60	1.96	1.46	1.21	1.49	1.73	1.79	1.49	1.11	1.69	2.29	2.63	1.68
100	7.6	6.7	5.4	6.0	10.1	7.7	6.8	5.9	5.2	10.8	12.0	8.7	9.2
	2.97	2.23	1.66	1.27	1.53	1.87	2.03	1.67	1.16	1.73	2.37	2.95	1.77
200	9.3	8.2	6.5	7.0	11.5	9.1	8.2	7.1	6.1	12.4	13.7	10.5	10.7
	2.86	2.15	1.60	1.29	1.57	1.88	1.96	1.63	1.18	1.77	2.43	2.88	1.83
Freq	7.3	3.6	2.7	3.3	8.6	10.1	7.2	3.5	3.1	9.4	27.6	13.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	9.3	1122	6.7	453	5.8	297	4.5	142
25	10.1	1433	7.8	704	7.0	514	5.9	302
50	10.7	1705	8.8	950	8.1	736	7.0	482
100	11.5	2057	9.9	1284	9.2	1032	8.2	726
200	12.3	2573	11.5	1913	10.7	1548	9.5	1109

Mont de Marsan

43° 55 ′ 00″ N	00° 30 ′ 00″ E	UTM 31	E 299272 m	N 4865744 m	63 m a.s.l.

Location in SW France 90 km N of the foothills of the Pyrenées and 70 km E of the Atlantic Ocean. The whole area is flat and densely forested. The site is 2 km N of the city of Mont de Marsan and the city extends all the way to the site.
The anemometer is placed to the S of the runway with many buildings appearing from ESE to SW.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.60										
30	0.01	1100	0.60										
60	0.01	1200	0.60										
90	0.01	800	0.60										
120	0.01	200	0.15	1000	0.45								
150	0.01	150	0.45										
180	0.01	100	0.50										
210	0.01	100	0.50										
240	0.01	200	0.50										
270	0.01	750	0.10	2000	0.40								
300	0.01	800	0.60										
330	0.01	600	0.60										

Height of anemometer: 10.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.8	504	176	145	86	48	19	9	11	2	0	0	0	0	0	1.7	1.09
30	5.5	505	194	144	88	49	12	6	0	2	0	0	0	0	0	1.6	1.15
60	8.7	393	263	176	103	41	15	8	2	0	0	0	0	0	0	1.9	1.34
90	13.6	281	266	209	136	70	30	7	2	1	0	0	0	0	0	2.4	1.54
120	7.1	392	211	177	116	62	29	9	3	0	0	0	0	0	0	2.1	1.35
150	3.7	656	163	96	52	26	7	0	1	0	0	0	0	0	0	1.0	0.92
180	3.6	645	167	121	40	17	5	3	2	0	0	0	0	0	0	1.0	0.94
210	5.9	443	208	166	99	38	26	12	6	1	2	1	0	0	0	1.9	1.16
240	12.9	251	200	193	149	97	53	27	17	6	4	0	1	0	0	2.9	1.46
270	16.8	224	177	156	126	115	80	53	33	23	12	1	0	1	0	3.5	1.44
300	11.6	280	170	163	124	97	72	45	25	13	10	2	0	0	0	3.1	1.36
330	5.9	422	180	142	101	77	42	22	10	3	1	0	0	0	0	2.2	1.19
Total	100.0	353	203	167	115	74	42	23	13	7	4	0	0	0	0	2.4	1.24

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	1.6	1.6	1.6	1.8	1.9	1.3	1.2	1.2	1.0	1.3	1.4	1.6	1.5
3	1.6	1.6	1.6	1.5	1.6	1.1	1.0	0.9	0.9	1.2	1.4	1.5	1.3
6	1.6	1.8	1.5	1.5	1.5	1.2	0.9	1.0	1.0	1.3	1.4	1.6	1.3
9	1.8	2.0	2.3	2.6	2.6	2.3	2.0	2.0	1.6	1.8	1.6	1.7	2.0
12	2.6	3.2	3.5	3.6	3.3	2.8	2.9	2.9	2.7	2.5	2.6	2.3	2.9
15	2.7	3.6	3.9	4.3	3.7	3.2	3.3	3.3	2.9	2.7	2.6	2.4	3.2
18	1.8	2.5	2.9	3.8	3.6	3.5	3.1	3.0	2.1	1.7	1.6	1.8	2.6
21	1.6	1.8	1.9	2.3	2.2	2.1	1.9	1.7	1.3	1.4	1.5	1.7	1.8
Day	1.9	2.3	2.4	2.7	2.5	2.2	2.0	2.0	1.7	1.7	1.7	1.8	2.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	2.7	2.9	3.5	3.7	3.2	2.2	3.7	5.3	5.6	5.2	4.4	4.1
	1.33	1.32	1.51	1.72	1.68	1.39	1.08	1.24	1.62	1.74	1.65	1.50	1.43
25	3.6	3.0	3.2	3.8	4.1	3.5	2.5	4.0	5.8	6.1	5.7	4.8	4.5
	1.37	1.36	1.56	1.77	1.73	1.44	1.11	1.27	1.67	1.79	1.70	1.55	1.47
50	3.8	3.3	3.4	4.1	4.4	3.8	2.7	4.3	6.3	6.6	6.1	5.2	4.9
	1.40	1.39	1.60	1.81	1.77	1.47	1.13	1.31	1.72	1.84	1.74	1.59	1.50
100	4.1	3.5	3.7	4.5	4.7	4.1	2.8	4.7	6.8	7.1	6.6	5.6	5.3
	1.36	1.35	1.55	1.76	1.72	1.42	1.10	1.27	1.67	1.78	1.69	1.54	1.46
200	4.5	3.8	4.1	4.9	5.2	4.5	3.1	5.1	7.5	7.8	7.3	6.2	5.8
	1.29	1.28	1.47	1.67	1.63	1.35	1.04	1.21	1.58	1.69	1.60	1.46	1.40
Freq	5.3	5.1	7.1	11.2	10.4	5.4	3.6	4.7	9.5	15.1	14.0	8.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	1.8	2.0	2.6	2.6	1.9	1.7	2.7	3.8	3.8	3.5	2.8	2.8
	1.10	1.13	1.29	1.49	1.39	1.09	1.01	1.10	1.41	1.45	1.37	1.23	1.24
25	2.5	2.2	2.5	3.1	3.2	2.3	2.1	3.3	4.5	4.6	4.2	3.4	3.4
	1.17	1.22	1.39	1.61	1.50	1.17	1.08	1.19	1.52	1.56	1.47	1.32	1.32
50	3.0	2.6	2.9	3.6	3.7	2.8	2.5	3.9	5.3	5.3	5.0	4.0	4.0
	1.31	1.36	1.56	1.81	1.68	1.31	1.21	1.33	1.71	1.75	1.65	1.48	1.46
100	3.6	3.2	3.4	4.3	4.4	3.3	3.0	4.7	6.3	6.3	5.9	4.8	4.8
	1.39	1.45	1.65	1.92	1.79	1.39	1.28	1.41	1.82	1.87	1.75	1.58	1.54
200	4.4	3.9	4.3	5.3	5.4	4.1	3.7	5.8	7.8	7.9	7.3	5.9	6.0
	1.33	1.38	1.58	1.84	1.71	1.33	1.23	1.35	1.74	1.78	1.67	1.51	1.48
Freq	5.0	5.3	7.9	12.4	8.6	4.5	3.6	5.3	11.3	16.2	12.7	7.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	1.6	1.8	2.2	2.3	1.6	1.6	2.4	3.3	3.3	3.0	2.3	2.5
	1.10	1.13	1.32	1.50	1.35	1.08	1.04	1.13	1.42	1.44	1.36	1.21	1.24
25	2.2	2.0	2.2	2.8	2.8	2.0	2.0	3.1	4.1	4.1	3.8	2.9	3.1
	1.17	1.21	1.41	1.60	1.44	1.14	1.11	1.21	1.52	1.54	1.46	1.29	1.31
50	2.7	2.4	2.7	3.3	3.3	2.4	2.4	3.7	4.9	4.8	4.5	3.4	3.7
	1.28	1.33	1.56	1.77	1.60	1.26	1.22	1.33	1.68	1.71	1.61	1.42	1.44
100	3.2	2.8	3.2	3.9	4.0	2.9	2.9	4.4	5.8	5.8	5.4	4.2	4.4
	1.40	1.46	1.71	1.94	1.75	1.38	1.33	1.45	1.85	1.87	1.76	1.56	1.55
200	3.9	3.5	3.9	4.8	4.9	3.6	3.5	5.4	7.2	7.1	6.7	5.1	5.4
	1.35	1.40	1.64	1.86	1.67	1.32	1.27	1.39	1.77	1.79	1.69	1.49	1.50
Freq	4.9	5.4	8.3	12.9	7.9	4.2	3.6	5.5	12.0	16.6	12.2	6.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.4	1.3	1.5	1.8	1.8	1.0	1.1	2.0	2.6	2.6	2.4	1.7	2.0
	1.10	1.17	1.38	1.57	1.36	0.93	0.97	1.15	1.45	1.45	1.37	1.21	1.25
25	1.8	1.7	2.0	2.4	2.4	1.3	1.5	2.6	3.5	3.4	3.2	2.3	2.6
	1.16	1.23	1.46	1.67	1.44	0.98	1.02	1.21	1.54	1.54	1.44	1.28	1.31
50	2.3	2.0	2.4	3.0	3.0	1.6	1.9	3.2	4.3	4.2	3.9	2.8	3.2
	1.25	1.33	1.58	1.81	1.56	1.05	1.10	1.31	1.67	1.67	1.56	1.38	1.41
100	2.8	2.5	2.9	3.6	3.6	2.1	2.4	4.0	5.2	5.1	4.7	3.5	3.9
	1.42	1.51	1.80	2.06	1.77	1.19	1.24	1.49	1.90	1.90	1.78	1.57	1.58
200	3.4	3.1	3.5	4.4	4.4	2.5	2.9	4.8	6.3	6.2	5.8	4.2	4.8
	1.37	1.46	1.74	1.98	1.71	1.15	1.20	1.43	1.83	1.83	1.71	1.51	1.53
Freq	4.8	5.5	8.7	13.5	7.0	3.7	3.6	5.8	13.1	16.9	11.5	5.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	3.8	94	2.6	42	2.3	28	1.8	13
25	4.1	118	3.2	64	2.8	47	2.4	28
50	4.4	142	3.7	85	3.3	66	2.9	44
100	4.8	189	4.3	131	4.0	100	3.5	67
200	5.3	275	5.4	268	4.9	197	4.3	127

Nantes

47° 10′ 00″ N	01° 37′ 00″ W	UTM 30	E 604845 m	N 5224714 m	27 m a.s.l.

Location in the valley of the Loire 7 km SW of the centre of the city of Nantes, with the suburbs almost reaching the airport boundary from NW through N to E. The landscape is flat but has a closed appearance with small fields, hedges and trees and small forests. The anemometer is placed N of the runways with rows of trees at a distance of 200 m to the N.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	200	0.40										
30	0.01	200	0.40										
60	0.01	750	0.40	4000	0.60								
90	0.01	750	0.60	1700	0.40								
120	0.01	500	0.40										
150	0.01	1000	0.40										
180	0.01	1400	0.40										
210	0.01	600	0.15	1200	0.40								
240	0.01	500	0.40										
270	0.01	800	0.40										
300	0.01	600	0.40										
330	0.01	200	0.40										

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.4	125	180	244	196	120	71	38	15	8	3	0	0	0	0	3.4	1.79
30	11.5	85	143	219	200	143	101	55	31	18	5	0	0	0	0	4.0	1.91
60	10.2	75	116	174	196	159	120	79	39	24	15	1	0	0	0	4.4	2.00
90	5.6	127	156	202	195	125	80	63	29	13	10	1	0	0	0	3.8	1.74
120	5.7	128	155	226	176	143	79	47	26	10	7	3	0	0	0	3.7	1.73
150	6.1	129	134	187	152	128	100	69	43	31	22	5	1	0	0	4.2	1.64
180	7.4	113	129	180	172	129	81	68	49	29	35	9	6	0	0	4.3	1.51
210	8.9	90	105	169	160	133	108	81	63	37	43	7	3	0	0	4.8	1.74
240	11.5	69	109	155	155	133	108	88	67	44	53	11	6	1	0	5.1	1.73
270	11.8	87	118	143	152	138	119	89	62	39	42	11	1	1	0	4.9	1.80
300	7.9	122	160	203	168	127	88	50	34	23	19	4	0	0	0	3.9	1.61
330	6.0	153	233	252	151	106	50	23	15	9	5	2	0	1	0	3.1	1.46
Total	100.0	102	139	191	173	134	96	66	42	26	24	5	2	0	0	4.2	1.65

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.8	3.8	3.5	3.3	2.7	2.5	2.5	2.3	2.5	2.5	3.3	4.0	3.1
3	3.8	3.8	3.4	3.2	2.6	2.3	2.3	2.2	2.4	2.5	3.2	4.0	3.0
6	3.8	3.9	3.5	3.3	2.9	2.5	2.4	2.1	2.5	2.7	3.3	3.9	3.1
9	4.0	4.3	4.5	4.8	4.2	3.6	3.7	3.5	3.6	3.4	3.6	4.2	3.9
12	4.9	5.3	5.5	5.4	4.7	4.3	4.2	4.2	4.6	4.2	4.6	5.0	4.7
15	4.8	5.4	5.8	5.5	4.9	4.7	4.7	4.6	4.7	4.1	4.4	4.7	4.9
18	3.9	4.1	4.5	4.5	4.3	4.3	4.5	4.1	3.4	2.6	3.3	4.2	4.0
21	3.8	3.9	3.6	3.4	2.9	2.8	2.8	2.6	2.6	2.6	3.4	4.1	3.2
Day	4.1	4.3	4.3	4.2	3.7	3.4	3.4	3.2	3.3	3.1	3.6	4.3	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	7.0	7.0	6.3	5.8	6.1	6.4	7.0	7.8	7.8	6.8	5.8	6.8
	1.91	2.17	2.29	2.20	2.02	1.94	1.83	1.92	1.98	2.06	1.97	1.76	1.96
25	6.6	7.7	7.7	6.9	6.4	6.7	7.0	7.7	8.6	8.5	7.4	6.4	7.4
	1.97	2.24	2.36	2.26	2.09	2.01	1.89	1.98	2.03	2.12	2.03	1.82	2.02
50	7.1	8.2	8.2	7.4	6.8	7.2	7.5	8.3	9.2	9.1	8.0	6.9	8.0
	2.02	2.30	2.42	2.33	2.14	2.06	1.94	2.03	2.09	2.18	2.08	1.87	2.08
100	7.7	8.9	8.9	8.0	7.4	7.8	8.1	9.0	9.9	9.9	8.6	7.4	8.7
	1.96	2.23	2.35	2.25	2.07	1.99	1.88	1.97	2.03	2.11	2.02	1.81	2.01
200	8.5	9.9	9.9	8.9	8.2	8.6	9.0	9.9	10.9	10.9	9.5	8.2	9.6
	1.85	2.11	2.22	2.13	1.96	1.89	1.78	1.87	1.94	2.00	1.91	1.71	1.92
Freq	6.8	9.6	11.0	7.6	5.6	6.0	6.8	8.3	10.4	11.6	9.6	6.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	5.0	4.8	4.2	4.1	4.3	4.4	5.0	5.5	5.3	4.4	4.0	4.7
	1.71	1.85	1.94	1.76	1.71	1.62	1.50	1.67	1.69	1.75	1.60	1.48	1.66
25	5.2	6.0	5.8	5.1	4.9	5.2	5.3	6.0	6.6	6.3	5.3	4.8	5.7
	1.84	1.99	2.09	1.90	1.84	1.74	1.62	1.80	1.80	1.89	1.73	1.59	1.79
50	6.0	6.9	6.7	5.9	5.7	6.0	6.1	7.0	7.6	7.4	6.2	5.6	6.6
	2.07	2.24	2.35	2.13	2.07	1.96	1.81	2.03	1.99	2.12	1.94	1.79	1.99
100	7.2	8.2	7.9	7.0	6.7	7.2	7.3	8.3	8.9	8.7	7.4	6.7	7.8
	2.20	2.38	2.51	2.27	2.20	2.09	1.93	2.16	2.13	2.26	2.06	1.90	2.13
200	8.9	10.2	9.8	8.7	8.4	8.9	9.1	10.4	10.9	10.9	9.1	8.3	9.7
	2.10	2.28	2.39	2.17	2.10	1.99	1.85	2.06	2.04	2.16	1.97	1.82	2.04
Freq	7.1	10.6	10.7	6.5	5.7	6.1	7.2	8.6	11.0	11.8	8.6	6.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.4	4.2	3.6	3.5	3.8	3.9	4.4	4.9	4.6	3.8	3.5	4.1
	1.75	1.86	1.96	1.74	1.69	1.63	1.52	1.68	1.70	1.76	1.60	1.46	1.67
25	4.7	5.4	5.2	4.5	4.4	4.7	4.8	5.5	6.0	5.7	4.7	4.3	5.1
	1.87	1.99	2.10	1.87	1.81	1.74	1.63	1.80	1.79	1.88	1.71	1.56	1.78
50	5.6	6.4	6.1	5.3	5.2	5.5	5.7	6.4	7.0	6.7	5.5	5.1	6.0
	2.07	2.20	2.32	2.06	2.00	1.92	1.80	1.99	1.95	2.08	1.89	1.73	1.96
100	6.6	7.6	7.2	6.3	6.2	6.6	6.8	7.7	8.2	7.9	6.6	6.1	7.2
	2.28	2.42	2.55	2.27	2.19	2.12	1.98	2.19	2.14	2.28	2.08	1.90	2.15
200	8.2	9.4	8.9	7.8	7.6	8.1	8.3	9.5	10.0	9.8	8.1	7.5	8.8
	2.18	2.32	2.44	2.17	2.10	2.03	1.89	2.09	2.06	2.19	1.99	1.82	2.06
Freq	7.2	11.0	10.6	6.1	5.7	6.1	7.3	8.7	11.2	11.8	8.3	6.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.5	3.2	2.8	2.8	3.0	3.0	3.5	3.8	3.6	2.9	2.8	3.3
	1.80	1.88	1.96	1.73	1.73	1.63	1.52	1.71	1.72	1.77	1.59	1.50	1.69
25	4.0	4.6	4.3	3.7	3.7	4.0	4.0	4.7	5.1	4.7	3.8	3.7	4.3
	1.90	2.00	2.07	1.83	1.83	1.73	1.61	1.81	1.80	1.88	1.69	1.59	1.78
50	4.9	5.6	5.2	4.4	4.5	4.8	4.9	5.6	6.1	5.7	4.7	4.4	5.2
	2.07	2.17	2.25	1.99	1.99	1.88	1.75	1.97	1.93	2.04	1.83	1.73	1.92
100	5.9	6.7	6.2	5.4	5.4	5.8	5.9	6.8	7.3	6.9	5.6	5.4	6.3
	2.36	2.47	2.57	2.27	2.27	2.14	1.99	2.24	2.17	2.32	2.08	1.96	2.18
200	7.2	8.2	7.6	6.6	6.7	7.1	7.3	8.3	8.8	8.4	6.9	6.6	7.6
	2.27	2.38	2.47	2.19	2.19	2.06	1.92	2.16	2.11	2.24	2.01	1.89	2.11
Freq	7.4	11.7	10.1	5.6	5.8	6.2	7.4	8.9	11.6	11.7	7.7	6.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	260	4.2	108	3.7	71	2.9	34
25	6.6	332	5.0	169	4.5	124	3.8	74
50	7.1	401	5.8	232	5.3	180	4.6	119
100	7.7	525	6.9	363	6.3	278	5.6	185
200	8.5	744	8.6	720	7.8	537	6.8	345

Nîmes

43° 45′ 00″ N 04° 25′ 00″ E	UTM 31 E 614061 m N 4845170 m	96 m a.s.l.

Located in the Rhône valley 40 km N of the Mediterranean Sea. The centre of the city of Nîmes is 8 km NW of the site. The landscape out to a distance of 5 to 10 km is flat and characterized by vineyards, small scattered forests and villages. The anemometer is placed N of the runway. There are no obstacles closer than about 1000 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	400	0.20										
30	0.01	700	0.20										
60	0.01	700	0.20										
90	0.01	400	0.10	750	0.30	1600	0.20						
120	0.01	600	0.10	1200	0.20								
150	0.01	1000	0.10	2000	0.20								
180	0.01	2000	0.07	3000	0.20								
210	0.01	1000	0.20										
240	0.01	600	0.20										
270	0.01	600	0.20										
300	0.01	500	0.20										
330	0.01	400	0.30	1000	0.20								

Height of anemometer: 11.3 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	20.1	45	75	108	116	127	105	96	86	72	99	46	19	5	2	6.5	1.85
30	14.7	62	123	176	162	135	99	83	61	42	40	14	4	0	0	4.8	1.68
60	7.0	122	198	253	242	106	47	14	12	2	4	0	0	0	0	3.3	1.99
90	4.9	144	185	215	170	120	72	39	26	14	12	3	0	0	0	3.5	1.56
120	6.0	110	125	148	125	125	103	76	67	44	51	18	7	3	0	5.0	1.61
150	5.9	89	99	113	118	96	111	96	76	60	89	37	13	4	0	6.0	1.80
180	5.0	122	110	129	156	182	125	88	40	25	18	6	1	0	0	4.7	2.04
210	3.9	144	144	201	196	146	95	47	18	4	4	1	0	0	0	3.7	1.94
240	4.3	170	157	235	205	128	61	28	7	4	3	2	0	0	0	3.3	1.86
270	5.5	136	149	223	207	130	72	33	25	12	12	0	1	0	0	3.6	1.73
300	9.0	78	108	176	185	160	105	72	49	34	26	8	0	0	0	4.6	1.80
330	13.7	57	81	145	152	131	109	89	73	50	70	32	9	2	1	5.6	1.69
Total	100.0	87	116	164	160	132	96	73	56	40	49	20	7	2	1	4.8	1.54

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.2	4.3	4.1	3.7	3.1	3.0	3.3	2.9	3.2	3.7	4.0	4.2	3.6
3	4.3	4.3	4.1	3.6	3.2	2.9	3.3	3.0	3.2	3.5	4.0	4.3	3.6
6	4.2	4.4	3.9	3.5	3.1	3.1	3.3	3.0	3.5	3.6	4.0	4.3	3.6
9	4.4	5.0	5.2	5.5	4.6	4.6	5.0	4.6	4.8	4.7	4.6	4.5	4.8
12	5.4	5.8	5.7	5.9	4.9	4.7	5.0	4.9	4.9	5.2	5.4	5.4	5.3
15	5.2	6.0	5.9	6.2	5.5	5.4	5.7	5.5	5.1	5.0	5.2	5.0	5.5
18	4.4	4.9	4.9	5.2	4.9	4.8	5.1	4.7	4.1	3.9	4.2	4.4	4.6
21	4.1	4.5	4.3	4.0	3.3	3.4	3.7	3.2	3.4	3.6	4.0	4.4	3.8
Day	4.5	4.9	4.8	4.7	4.1	4.0	4.3	4.0	4.0	4.2	4.4	4.6	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.6	8.2	5.9	5.2	6.9	8.2	7.2	5.8	5.1	5.3	6.6	8.2	7.4
	1.97	1.86	1.79	1.91	1.77	1.94	2.03	2.27	2.20	2.05	2.05	1.85	1.74
25	10.5	9.0	6.4	5.6	7.5	8.9	7.9	6.3	5.6	5.8	7.2	8.9	8.1
	2.00	1.90	1.85	1.97	1.83	1.98	2.09	2.35	2.27	2.11	2.11	1.88	1.77
50	11.2	9.6	6.9	6.1	8.1	9.5	8.5	6.8	6.0	6.3	7.8	9.6	8.7
	2.05	1.95	1.90	2.02	1.88	2.04	2.14	2.41	2.33	2.17	2.17	1.94	1.81
100	12.0	10.3	7.5	6.6	8.7	10.3	9.2	7.4	6.5	6.8	8.4	10.3	9.3
	2.02	1.91	1.84	1.96	1.82	1.99	2.08	2.33	2.26	2.10	2.10	1.90	1.79
200	12.9	11.2	8.3	7.3	9.6	11.2	10.2	8.2	7.2	7.5	9.3	11.1	10.2
	1.97	1.84	1.74	1.85	1.73	1.91	1.96	2.20	2.13	1.99	1.99	1.83	1.74
Freq	17.8	16.5	9.8	5.8	5.7	6.0	5.3	4.3	4.1	5.0	7.7	12.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.0	5.3	3.7	3.7	5.0	5.9	4.7	3.8	3.5	3.8	4.8	6.0	5.2
	1.81	1.62	1.62	1.56	1.55	1.74	1.85	1.90	1.82	1.70	1.76	1.67	1.55
25	8.3	6.3	4.4	4.5	6.0	7.0	5.6	4.6	4.2	4.5	5.7	7.1	6.2
	1.88	1.73	1.75	1.69	1.66	1.84	1.99	2.06	1.96	1.83	1.89	1.75	1.63
50	9.3	7.3	5.1	5.2	7.0	8.0	6.5	5.3	4.9	5.3	6.6	8.1	7.1
	1.98	1.91	1.96	1.89	1.84	2.00	2.24	2.31	2.20	2.06	2.13	1.88	1.76
100	10.6	8.6	6.1	6.2	8.2	9.3	7.7	6.3	5.8	6.3	7.9	9.3	8.3
	2.13	2.05	2.09	2.01	1.96	2.15	2.39	2.46	2.35	2.19	2.27	2.02	1.90
200	12.3	10.5	7.5	7.7	10.1	11.2	9.6	7.9	7.2	7.8	9.8	11.1	10.0
	2.06	1.96	2.00	1.92	1.88	2.07	2.28	2.35	2.24	2.09	2.16	1.95	1.88
Freq	19.3	15.4	8.0	5.2	5.9	5.9	5.1	4.0	4.2	5.3	8.6	13.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.2	4.4	3.0	3.3	4.5	5.2	4.0	3.3	3.1	3.3	4.2	5.3	4.5
	1.82	1.63	1.78	1.54	1.58	1.76	1.92	1.90	1.83	1.69	1.78	1.68	1.55
25	7.5	5.5	3.8	4.1	5.5	6.4	4.9	4.1	3.8	4.1	5.2	6.5	5.6
	1.88	1.75	1.91	1.64	1.67	1.84	2.06	2.03	1.96	1.81	1.90	1.75	1.63
50	8.6	6.4	4.4	4.8	6.5	7.4	5.8	4.8	4.4	4.8	6.1	7.5	6.5
	1.97	1.94	2.11	1.82	1.82	1.98	2.28	2.25	2.17	2.00	2.11	1.86	1.74
100	9.8	7.7	5.3	5.8	7.7	8.7	6.9	5.7	5.3	5.8	7.3	8.7	7.7
	2.14	2.12	2.32	1.99	2.00	2.17	2.51	2.47	2.38	2.20	2.31	2.03	1.91
200	11.4	9.5	6.5	7.1	9.3	10.4	8.5	7.0	6.6	7.1	9.0	10.3	9.2
	2.08	2.03	2.22	1.91	1.92	2.10	2.40	2.37	2.28	2.10	2.21	1.97	1.89
Freq	19.8	15.0	7.3	5.0	6.0	5.9	5.0	3.9	4.3	5.4	8.9	13.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	3.3	2.3	2.7	3.6	4.0	3.1	2.6	2.4	2.7	3.4	4.3	3.6
	1.81	1.63	1.88	1.54	1.61	1.74	1.95	1.91	1.81	1.71	1.73	1.71	1.56
25	6.2	4.4	3.1	3.6	4.8	5.3	4.0	3.4	3.2	3.6	4.5	5.6	4.7
	1.86	1.73	2.00	1.63	1.69	1.81	2.06	2.02	1.92	1.81	1.83	1.77	1.62
50	7.3	5.4	3.7	4.4	5.7	6.3	4.9	4.1	3.9	4.3	5.4	6.6	5.6
	1.93	1.88	2.17	1.77	1.81	1.92	2.24	2.20	2.09	1.97	1.99	1.86	1.72
100	8.6	6.5	4.5	5.3	6.9	7.5	5.9	4.9	4.7	5.3	6.6	7.8	6.7
	2.07	2.14	2.47	2.02	2.05	2.13	2.56	2.50	2.38	2.24	2.26	2.02	1.88
200	10.1	7.9	5.5	6.5	8.3	9.0	7.2	6.0	5.7	6.4	8.0	9.3	8.1
	2.09	2.06	2.38	1.95	1.99	2.10	2.46	2.41	2.29	2.16	2.18	2.02	1.90
Freq	19.8	14.0	6.8	5.0	6.0	5.8	4.9	3.9	4.4	5.8	9.3	14.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	391	4.7	161	4.1	107	3.2	51
25	7.2	498	5.5	252	5.0	184	4.2	109
50	7.7	594	6.3	341	5.8	265	5.0	175
100	8.3	754	7.4	494	6.8	386	6.0	266
200	9.1	1015	8.9	879	8.2	679	7.2	456

Orléans

47° 59′ 00″ N	01° 45′ 00″ E	UTM 31	E 406721 m	N 5315307 m	125 m a.s.l.

Located 15 km NW of the centre of the city of Orléans in the Loire valley. The suburbs extend to about 8 km from the aerodrome. In the sectors from NE through S to SW there are large forests at distances of: SW and S: 6 km, NE: 10 km. Closer to the site the landscape consists of flat open fields with few obstacles. The anemometer is placed S of the runways with the airport buildings in the SE sector, more than 400 m away.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1700	0.07										
30	0.01	1300	0.20	2300	0.07								
60	0.01	800	0.20	2500	0.07								
90	0.01	700	0.35	1400	0.07								
120	0.01	500	0.30	1500	0.07	3200	0.25						
150	0.01	250	0.15	750	0.07								
180	0.01	250	0.07	1500	0.30								
210	0.01	750	0.10	3500	0.40								
240	0.01	800	0.07										
270	0.01	1800	0.07										
300	0.01	1700	0.07										
330	0.01	1700	0.15	4000	0.07								

Height of anemometer: 10.0 m a.g.l. Period: 70073100-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.8	52	123	216	206	149	118	55	34	21	19	5	2	0	0	4.3	1.76
30	10.1	46	104	192	189	153	110	88	55	35	20	6	2	0	0	4.7	1.85
60	12.1	35	94	192	218	161	116	76	49	28	25	5	1	0	0	4.6	1.86
90	7.1	63	140	209	216	157	92	52	38	21	10	2	1	0	0	4.1	1.85
120	4.6	84	176	288	213	127	64	28	11	6	3	0	0	0	0	3.4	1.89
150	5.1	61	148	252	252	157	86	22	16	4	3	0	0	0	0	3.7	2.22
180	7.3	54	119	194	216	152	102	66	45	25	18	4	2	0	0	4.3	1.77
210	11.3	34	88	151	158	132	117	97	78	63	56	21	6	0	0	5.5	1.86
240	13.3	35	77	126	151	159	126	97	78	55	66	24	6	0	0	5.7	1.89
270	10.6	36	85	161	176	156	129	97	65	42	33	15	3	0	0	5.1	1.92
300	6.5	59	113	194	186	147	111	61	50	38	30	10	2	1	0	4.6	1.67
330	5.1	80	145	227	207	137	86	59	32	16	9	2	0	1	1	4.0	1.70
Total	100.0	48	108	187	192	150	110	74	52	34	30	10	3	0	0	4.7	1.73

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.4	4.1	4.1	4.0	3.5	3.1	2.9	3.0	3.3	3.2	4.1	4.4	3.7
3	4.2	4.1	4.1	3.9	3.5	3.1	2.9	2.9	3.1	3.1	4.0	4.4	3.6
6	4.2	4.1	4.2	4.1	3.8	3.4	3.1	2.9	3.2	3.2	4.0	4.4	3.7
9	4.4	4.5	5.2	5.6	4.9	4.1	4.0	4.1	4.2	3.9	4.5	4.5	4.5
12	5.2	5.4	6.1	6.1	5.3	4.7	4.4	4.7	4.9	4.5	5.2	5.2	5.1
15	5.1	5.3	6.2	6.3	5.5	4.8	4.5	4.7	4.9	4.5	4.8	4.8	5.1
18	4.4	4.3	4.8	5.2	4.6	4.3	4.2	4.1	3.8	3.3	4.2	4.3	4.3
21	4.4	4.2	4.3	4.1	3.5	3.1	3.1	3.1	3.3	3.2	4.3	4.4	3.7
Day	4.5	4.5	4.9	4.9	4.3	3.8	3.6	3.7	3.8	3.6	4.4	4.5	4.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.4	6.7	6.2	5.5	5.6	6.8	8.1	8.1	7.4	6.7	5.8	6.8
	2.06	2.17	2.23	2.19	2.21	2.48	2.11	2.13	2.24	2.26	2.10	1.96	2.07
25	6.4	7.1	7.3	6.8	6.0	6.1	7.4	8.8	8.9	8.1	7.3	6.4	7.5
	2.12	2.24	2.30	2.26	2.28	2.56	2.17	2.19	2.30	2.33	2.17	2.02	2.13
50	6.9	7.6	7.8	7.3	6.5	6.6	8.0	9.5	9.6	8.8	7.9	6.8	8.0
	2.18	2.30	2.37	2.31	2.35	2.63	2.23	2.25	2.37	2.39	2.22	2.07	2.18
100	7.4	8.2	8.5	7.9	7.0	7.1	8.6	10.2	10.4	9.5	8.5	7.4	8.7
	2.11	2.22	2.29	2.24	2.27	2.55	2.16	2.18	2.30	2.31	2.15	2.01	2.12
200	8.2	9.1	9.4	8.8	7.8	7.9	9.6	11.3	11.4	10.5	9.4	8.2	9.6
	2.00	2.11	2.17	2.12	2.15	2.41	2.05	2.08	2.18	2.19	2.04	1.90	2.02
Freq	6.3	9.0	11.4	8.7	5.4	4.9	6.6	10.1	12.7	11.5	7.8	5.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.6	4.6	4.2	3.7	4.0	4.9	5.8	5.6	5.0	4.5	3.9	4.7
	1.77	1.84	1.86	1.83	1.88	2.13	1.80	1.83	1.88	1.91	1.68	1.69	1.76
25	5.0	5.5	5.5	5.0	4.5	4.8	5.9	6.9	6.7	6.0	5.4	4.7	5.7
	1.90	1.98	2.01	1.98	2.03	2.31	1.95	1.96	2.03	2.06	1.81	1.83	1.89
50	5.8	6.3	6.4	5.8	5.2	5.6	6.8	7.9	7.8	7.0	6.3	5.5	6.6
	2.14	2.23	2.25	2.22	2.28	2.59	2.19	2.17	2.28	2.32	2.04	2.05	2.10
100	6.8	7.5	7.6	6.9	6.1	6.6	8.1	9.3	9.2	8.3	7.4	6.5	7.8
	2.28	2.37	2.40	2.37	2.43	2.76	2.33	2.32	2.42	2.47	2.17	2.18	2.24
200	8.5	9.4	9.5	8.6	7.6	8.2	10.1	11.4	11.5	10.3	9.2	8.1	9.7
	2.18	2.26	2.29	2.26	2.32	2.63	2.22	2.22	2.31	2.36	2.07	2.08	2.15
Freq	6.7	9.9	11.9	7.5	4.8	5.1	7.1	11.1	13.2	10.8	6.8	5.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	4.0	4.1	3.6	3.2	3.5	4.3	5.1	4.9	4.3	3.9	3.4	4.2
	1.80	1.88	1.90	1.86	1.89	2.17	1.77	1.86	1.91	1.91	1.69	1.69	1.78
25	4.5	5.0	5.0	4.5	4.0	4.4	5.3	6.3	6.1	5.4	4.8	4.2	5.1
	1.93	2.01	2.03	1.99	2.02	2.33	1.90	1.98	2.05	2.05	1.81	1.81	1.90
50	5.3	5.8	5.9	5.3	4.7	5.1	6.3	7.3	7.1	6.3	5.7	4.9	6.0
	2.13	2.22	2.25	2.20	2.24	2.58	2.10	2.15	2.26	2.26	2.01	2.00	2.08
100	6.3	7.0	7.0	6.3	5.6	6.1	7.4	8.6	8.5	7.5	6.8	5.9	7.2
	2.35	2.44	2.47	2.42	2.46	2.83	2.30	2.37	2.49	2.49	2.20	2.20	2.27
200	7.8	8.6	8.7	7.8	6.8	7.5	9.2	10.5	10.4	9.2	8.4	7.3	8.9
	2.24	2.34	2.37	2.32	2.35	2.71	2.20	2.28	2.38	2.38	2.11	2.10	2.19
Freq	6.9	10.1	12.0	7.0	4.6	5.1	7.4	11.4	13.3	10.5	6.5	5.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.2	3.2	2.8	2.6	2.9	3.5	4.0	3.8	3.4	3.0	2.7	3.3
	1.84	1.87	1.87	1.87	1.99	2.01	1.77	1.87	1.92	1.89	1.70	1.76	1.79
25	3.9	4.2	4.2	3.8	3.4	3.8	4.6	5.2	5.0	4.5	4.0	3.6	4.3
	1.95	1.98	1.99	1.98	2.11	2.13	1.88	1.97	2.04	2.01	1.80	1.87	1.89
50	4.7	5.1	5.1	4.6	4.1	4.6	5.6	6.3	6.1	5.4	4.8	4.4	5.2
	2.12	2.15	2.16	2.15	2.29	2.32	2.04	2.12	2.21	2.18	1.96	2.03	2.04
100	5.7	6.1	6.1	5.5	5.0	5.5	6.7	7.5	7.3	6.5	5.9	5.3	6.3
	2.41	2.45	2.45	2.45	2.61	2.64	2.33	2.40	2.52	2.48	2.23	2.31	2.30
200	6.9	7.4	7.5	6.7	6.1	6.8	8.2	9.1	9.0	7.9	7.2	6.4	7.7
	2.32	2.37	2.37	2.36	2.51	2.55	2.24	2.32	2.43	2.39	2.15	2.22	2.23
Freq	7.3	10.4	11.4	6.7	4.7	5.4	7.9	11.7	13.0	10.0	6.3	5.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	249	4.2	101	3.7	67	2.9	32
25	6.6	318	5.1	160	4.6	117	3.8	70
50	7.1	386	5.8	222	5.3	172	4.6	113
100	7.7	504	6.9	350	6.4	269	5.6	179
200	8.5	712	8.6	692	7.8	518	6.8	334

Perpignan

42° 44′ 00″ N	02° 52′ 00″ E	UTM 31 E 489084 m N 4731296 m	48 m a.s.l.

Location in the eastern foothills of the Pyrenées 15 km W of the Mediterranean Sea and 5 km NNW of the centre of the city of Perpignan. Out to 8 km from the site the terrain is flat or gently rolling and covered by vineyards.
The anemometer is placed S of the main runway with buildings appearing in the sectors SE and NW at a distance of approx. 100 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	800	0.15	2500	0.35								
30	0.01	600	0.15	2500	0.25								
60	0.01	400	0.10	1500	0.25								
90	0.01	500	0.15	1100	0.30							-1	
120	0.01	800	0.30									-11	
150	0.01	600	0.15	1500	0.50							-11	
180	0.01	400	0.15	2500	0.30								
210	0.01	250	0.15	2800	0.30								
240	0.01	250	0.15										
270	0.01	350	0.15										
300	0.01	700	0.15									-3	
330	0.01	350	0.10	2000	0.25							-3	

Height of anemometer: 10.5 m a.g.l. Period: 72110600–78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	5.8	142	198	175	144	80	79	49	41	37	39	13	3	0	1	3.8	1.28
30	3.8	190	243	213	173	101	39	23	13	3	1	0	0	0	0	2.9	1.66
60	4.4	149	220	215	190	113	66	32	9	6	0	0	0	0	0	3.2	1.81
90	5.8	115	160	176	190	168	104	53	13	11	11	1	0	0	0	3.9	1.97
120	6.9	86	113	126	163	156	138	82	59	36	34	6	2	0	0	4.9	1.96
150	3.6	180	121	122	122	109	96	60	58	47	75	10	0	0	0	4.7	1.55
180	2.3	257	214	114	68	39	44	46	58	34	56	51	15	5	0	3.8	1.04
210	3.2	242	321	238	94	38	21	12	14	9	10	2	0	0	0	2.3	1.17
240	7.2	207	331	275	135	36	9	2	1	3	2	0	2	0	0	2.4	1.53
270	8.2	164	286	250	148	69	32	17	9	5	10	4	2	3	0	2.8	1.23
300	23.6	42	69	72	82	87	87	91	90	75	135	91	48	20	8	8.0	2.00
330	25.3	41	64	69	72	79	90	94	96	99	147	87	40	17	5	8.2	2.22
Total	100.0	103	147	136	114	89	76	64	58	52	80	47	22	9	3	5.4	1.39

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.8	5.0	4.7	4.3	3.9	3.9	3.7	3.4	3.5	4.2	4.8	4.3	4.2
3	5.1	4.9	4.5	4.3	3.6	3.8	3.6	3.4	3.4	4.1	4.6	4.2	4.1
6	4.6	4.5	4.2	4.4	3.7	3.8	3.7	3.2	3.4	4.2	4.8	4.2	4.1
9	4.6	5.1	5.6	6.0	5.2	5.1	5.3	4.4	4.4	5.2	5.1	4.4	5.0
12	5.4	6.5	6.7	7.2	6.4	6.1	6.3	5.5	5.7	6.7	6.3	5.4	6.2
15	5.6	7.3	7.4	7.5	6.4	6.3	6.6	5.6	6.1	6.9	6.4	5.5	6.4
18	4.8	5.6	5.8	5.9	5.3	5.3	5.6	4.4	4.5	5.0	5.2	4.9	5.2
21	4.9	5.1	5.0	4.9	4.3	4.1	4.4	3.7	3.9	4.5	5.1	4.8	4.6
Day	5.0	5.5	5.5	5.6	4.9	4.8	4.9	4.2	4.4	5.1	5.3	4.7	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.6	5.1	4.8	5.8	7.7	8.3	7.2	4.1	4.0	4.3	10.7	12.5	8.8
	1.90	1.56	2.04	2.19	2.15	1.97	1.40	1.06	1.64	1.48	1.87	2.28	1.58
25	11.6	5.6	5.3	6.4	8.4	9.1	7.9	4.5	4.3	4.7	11.6	13.6	9.6
	1.92	1.60	2.10	2.26	2.22	2.01	1.42	1.08	1.69	1.52	1.88	2.30	1.59
50	12.3	6.0	5.6	6.9	9.1	9.7	8.4	4.8	4.7	5.1	12.4	14.4	10.3
	1.95	1.65	2.16	2.32	2.28	2.06	1.45	1.11	1.74	1.56	1.92	2.33	1.62
100	13.1	6.5	6.1	7.4	9.8	10.5	9.0	5.2	5.1	5.5	13.2	15.3	11.0
	1.94	1.60	2.09	2.25	2.20	2.02	1.44	1.09	1.69	1.51	1.91	2.33	1.62
200	14.1	7.1	6.8	8.2	10.9	11.4	9.6	5.6	5.6	6.0	14.1	16.4	11.8
	1.90	1.51	1.98	2.13	2.08	1.94	1.40	1.05	1.60	1.44	1.87	2.29	1.61
Freq	12.9	4.6	4.2	5.3	6.5	4.9	2.8	2.8	5.4	7.8	18.2	24.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	3.2	3.4	4.3	5.7	5.8	4.6	2.7	2.7	3.0	8.3	9.1	6.2
	1.42	1.42	1.74	1.89	1.87	1.61	1.14	1.05	1.48	1.23	1.91	2.17	1.47
25	7.0	3.9	4.1	5.1	6.8	6.9	5.4	3.3	3.3	3.6	9.6	10.6	7.4
	1.47	1.53	1.88	2.04	2.01	1.68	1.17	1.13	1.59	1.31	1.96	2.21	1.51
50	7.9	4.6	4.8	5.9	7.9	7.8	6.2	4.0	3.8	4.3	10.8	11.9	8.3
	1.54	1.72	2.11	2.30	2.24	1.81	1.23	1.26	1.79	1.48	2.03	2.29	1.57
100	9.0	5.4	5.7	7.0	9.3	9.1	7.1	4.8	4.6	5.1	12.1	13.3	9.5
	1.65	1.83	2.24	2.44	2.40	1.94	1.31	1.34	1.90	1.56	2.16	2.44	1.68
200	10.4	6.8	7.1	8.7	11.5	10.7	8.1	5.9	5.7	6.3	13.7	15.0	11.1
	1.60	1.75	2.14	2.33	2.29	1.88	1.27	1.28	1.81	1.50	2.11	2.39	1.71
Freq	8.5	4.1	4.3	5.6	6.7	4.1	2.5	3.0	6.5	8.1	21.6	24.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	2.8	3.0	3.8	5.1	5.1	3.8	2.3	2.3	2.7	7.3	8.0	5.4
	1.28	1.54	1.77	1.92	1.90	1.58	1.08	1.11	1.50	1.24	1.97	2.19	1.47
25	5.2	3.4	3.8	4.7	6.3	6.2	4.7	3.0	2.9	3.3	8.9	9.6	6.6
	1.33	1.65	1.89	2.06	2.03	1.64	1.11	1.18	1.60	1.32	2.01	2.24	1.51
50	6.0	4.1	4.4	5.4	7.3	7.2	5.4	3.5	3.4	4.0	10.1	10.9	7.6
	1.39	1.82	2.09	2.28	2.22	1.74	1.15	1.30	1.77	1.46	2.08	2.30	1.56
100	7.0	4.8	5.3	6.5	8.6	8.3	6.2	4.3	4.1	4.8	11.4	12.4	8.8
	1.52	2.00	2.30	2.50	2.44	1.90	1.23	1.42	1.94	1.60	2.20	2.43	1.66
200	8.2	6.0	6.5	8.0	10.6	9.8	7.1	5.3	5.1	5.9	13.1	14.1	10.3
	1.48	1.92	2.20	2.39	2.35	1.85	1.21	1.37	1.86	1.53	2.19	2.43	1.70
Freq	6.9	3.9	4.3	5.7	6.8	3.8	2.4	3.1	6.9	8.2	22.9	25.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.2	2.5	3.0	4.1	3.9	2.7	1.9	1.9	2.4	5.8	6.2	4.3
	1.30	1.64	1.79	1.88	1.93	1.53	1.02	1.22	1.50	1.08	2.02	2.19	1.47
25	3.7	2.8	3.2	4.0	5.3	5.2	3.5	2.5	2.5	3.2	7.5	8.1	5.5
	1.37	1.74	1.89	1.99	2.03	1.58	1.04	1.29	1.59	1.12	2.06	2.23	1.50
50	4.5	3.4	3.9	4.8	6.4	6.2	4.2	3.1	3.1	3.8	8.9	9.5	6.6
	1.49	1.89	2.06	2.17	2.19	1.66	1.06	1.39	1.73	1.17	2.11	2.29	1.55
100	5.5	4.2	4.7	5.8	7.7	7.3	5.0	3.8	3.7	4.7	10.3	11.0	7.8
	1.69	2.15	2.35	2.47	2.49	1.79	1.12	1.58	1.96	1.29	2.21	2.38	1.63
200	6.7	5.1	5.8	7.1	9.3	8.6	5.8	4.6	4.5	5.6	11.9	12.7	9.2
	1.63	2.08	2.26	2.38	2.40	1.80	1.13	1.52	1.89	1.27	2.26	2.44	1.68
Freq	5.7	3.8	4.5	5.8	6.7	3.6	2.3	3.5	7.3	9.2	23.5	24.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	771	5.7	311	4.9	204	3.9	98
25	8.6	983	6.6	485	6.0	353	5.0	208
50	9.2	1165	7.5	654	6.9	506	5.9	332
100	9.8	1426	8.5	881	7.9	708	7.0	502
200	10.6	1800	9.9	1360	9.2	1089	8.2	779

Poitiers

46° 35′ 00″ N 00° 19′ 00″ E	UTM 31 E 294411 m	N 5162459 m	120 m a.s.l.

Location in the western part of central France, west of the city of Poitiers. The city extends almost to the site from NNE to SW. The landscape is rather flat and approx. 20% forested. The anemometer is placed at the E side of the aerodrome with buildings appearing in the sectors SE to NNE.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1700	0.07	4000	0.25								
30	0.01	100	0.40	350	0.03	750	0.30						
60	0.01	100	0.15	750	0.40	3500	0.15						
90	0.03	800	0.60	3500	0.40								
120	0.07	1000	0.40										
150	0.10	500	0.40	2000	0.30								
180	0.30	300	0.07	1000	0.35								
210	0.03	700	0.30	2500	0.25								
240	0.01	1200	0.10	1750	0.30								
270	0.01	800	0.10	2000	0.40							-5	
300	0.01	1000	0.20										
330	0.01	1100	0.20	2000	0.07								

Height of anemometer: 12.0 m a.g.l. Period: 70010103–78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.0	144	186	215	180	127	69	36	21	15	6	0	0	0	0	3.5	1.68
30	10.5	111	146	200	186	139	101	58	35	12	9	2	1	0	0	4.0	1.80
60	8.6	124	140	202	192	148	105	54	24	8	3	0	0	0	0	3.8	2.00
90	5.4	181	167	238	173	111	76	27	21	6	1	1	0	0	0	3.3	1.69
120	3.4	249	237	250	148	69	29	11	7	0	0	0	0	0	0	2.6	1.69
150	5.3	207	215	235	176	84	53	10	9	6	5	0	0	0	0	2.9	1.63
180	9.4	130	142	182	165	127	99	67	44	24	17	3	0	0	0	4.1	1.70
210	11.8	101	135	181	173	147	102	68	44	25	22	3	0	0	0	4.3	1.78
240	12.9	96	118	165	185	149	114	72	44	27	24	2	2	1	0	4.4	1.79
270	9.3	120	128	168	157	136	98	77	51	33	26	3	1	0	0	4.4	1.73
300	7.5	166	188	188	174	108	66	55	27	12	14	2	1	0	1	3.5	1.49
330	7.9	185	225	210	162	103	52	31	17	9	5	0	0	0	0	3.1	1.55
Total	100.0	138	159	195	174	128	87	53	32	17	13	2	1	0	0	3.8	1.66

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.4	3.5	3.2	2.9	2.5	2.2	2.3	2.0	2.1	2.2	3.1	3.2	2.7
3	3.3	3.4	3.1	2.8	2.3	2.1	2.0	1.8	2.1	2.1	3.0	3.2	2.6
6	3.3	3.5	3.1	2.7	2.5	2.3	2.0	1.8	2.0	2.2	3.0	3.1	2.6
9	3.5	3.9	4.1	4.1	3.6	3.3	3.1	3.1	3.2	3.0	3.5	3.3	3.5
12	4.4	5.1	5.1	4.9	4.2	4.0	3.9	3.7	4.1	3.8	4.5	4.1	4.3
15	4.3	5.0	5.2	5.1	4.4	4.1	4.1	4.0	4.1	3.8	4.3	3.9	4.4
18	3.6	3.8	4.0	4.3	3.8	3.8	3.9	3.5	2.9	2.4	3.4	3.4	3.6
21	3.6	3.8	3.3	3.1	2.6	2.4	2.6	2.3	2.2	2.4	3.4	3.4	2.9
Day	3.7	4.0	3.9	3.8	3.2	3.0	3.0	2.8	2.8	2.7	3.5	3.5	3.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	6.3	6.8	5.9	4.7	4.9	6.6	6.9	6.6	6.6	5.9	4.6	6.0
	1.90	1.91	2.21	2.13	1.93	1.87	1.86	2.06	2.10	2.04	1.81	1.76	1.90
25	5.0	6.9	7.4	6.5	5.2	5.3	7.3	7.6	7.2	7.3	6.4	5.0	6.6
	1.96	1.98	2.28	2.20	1.99	1.93	1.92	2.12	2.17	2.11	1.87	1.82	1.96
50	5.4	7.4	7.9	6.9	5.6	5.7	7.8	8.1	7.7	7.8	6.9	5.4	7.1
	2.02	2.03	2.34	2.25	2.05	1.98	1.97	2.17	2.23	2.16	1.92	1.87	2.00
100	5.8	8.0	8.6	7.5	6.0	6.2	8.5	8.8	8.4	8.4	7.5	5.9	7.7
	1.95	1.96	2.26	2.18	1.98	1.92	1.91	2.11	2.16	2.09	1.85	1.81	1.94
200	6.4	8.8	9.5	8.3	6.7	6.8	9.3	9.7	9.2	9.3	8.2	6.5	8.5
	1.85	1.86	2.15	2.06	1.88	1.82	1.81	1.99	2.04	1.98	1.76	1.71	1.85
Freq	8.0	9.4	9.4	6.7	4.2	4.5	7.7	10.9	12.5	10.7	8.2	7.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	4.7	4.6	3.9	3.1	3.5	4.9	4.7	4.5	4.7	3.7	3.0	4.2
	1.63	1.71	1.90	1.72	1.61	1.58	1.63	1.74	1.76	1.70	1.48	1.51	1.62
25	4.0	5.7	5.6	4.7	3.7	4.2	5.8	5.7	5.4	5.6	4.5	3.7	5.0
	1.76	1.84	2.05	1.86	1.74	1.71	1.76	1.88	1.90	1.83	1.60	1.63	1.73
50	4.6	6.6	6.4	5.4	4.3	4.9	6.8	6.6	6.3	6.5	5.3	4.3	5.9
	1.98	2.06	2.31	2.09	1.96	1.92	1.98	2.11	2.13	2.06	1.79	1.83	1.93
100	5.4	7.8	7.6	6.4	5.2	5.8	8.1	7.8	7.4	7.8	6.3	5.1	7.0
	2.10	2.20	2.45	2.22	2.08	2.04	2.11	2.24	2.27	2.19	1.90	1.95	2.04
200	6.8	9.7	9.5	8.0	6.4	7.2	10.0	9.7	9.2	9.6	7.8	6.3	8.6
	2.01	2.10	2.34	2.12	1.99	1.95	2.01	2.14	2.17	2.09	1.82	1.86	1.96
Freq	8.0	9.9	8.9	6.0	3.7	4.9	8.7	11.5	12.8	9.8	7.8	7.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	4.2	4.0	3.3	2.7	3.0	4.3	4.1	3.9	4.1	3.2	2.6	3.7
	1.67	1.74	1.92	1.68	1.64	1.58	1.65	1.75	1.79	1.71	1.47	1.54	1.62
25	3.6	5.2	5.0	4.1	3.3	3.8	5.3	5.1	4.9	5.1	4.0	3.3	4.5
	1.79	1.86	2.06	1.80	1.76	1.69	1.76	1.87	1.92	1.82	1.57	1.65	1.72
50	4.3	6.1	5.8	4.8	3.9	4.5	6.3	6.0	5.7	6.0	4.7	3.9	5.3
	1.98	2.06	2.28	1.99	1.94	1.87	1.95	2.07	2.12	2.02	1.74	1.82	1.89
100	5.1	7.3	7.0	5.7	4.6	5.3	7.5	7.1	6.8	7.2	5.6	4.6	6.4
	2.17	2.26	2.50	2.19	2.13	2.05	2.14	2.28	2.33	2.21	1.90	2.00	2.06
200	6.3	9.0	8.6	7.0	5.7	6.6	9.3	8.8	8.4	8.9	6.9	5.7	7.9
	2.08	2.16	2.39	2.09	2.05	1.96	2.05	2.18	2.23	2.12	1.83	1.92	1.98
Freq	8.0	10.1	8.8	5.7	3.5	5.1	9.1	11.7	12.9	9.4	7.7	7.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	3.3	3.1	2.5	2.1	2.5	3.4	3.2	3.1	3.2	2.4	2.0	2.9
	1.64	1.77	1.95	1.69	1.62	1.58	1.67	1.75	1.79	1.68	1.47	1.53	1.63
25	3.1	4.4	4.1	3.3	2.7	3.3	4.5	4.2	4.1	4.2	3.2	2.7	3.8
	1.74	1.88	2.06	1.79	1.71	1.68	1.77	1.86	1.90	1.77	1.56	1.62	1.72
50	3.8	5.3	5.0	4.1	3.3	4.0	5.4	5.1	5.0	5.1	3.9	3.3	4.6
	1.89	2.04	2.24	1.95	1.86	1.82	1.92	2.02	2.06	1.93	1.69	1.76	1.85
100	4.6	6.4	6.0	4.9	4.0	4.9	6.6	6.2	6.0	6.2	4.8	4.0	5.6
	2.15	2.32	2.55	2.22	2.11	2.07	2.18	2.30	2.35	2.20	1.92	2.00	2.08
200	5.6	7.9	7.3	6.0	4.9	6.0	8.0	7.5	7.3	7.6	5.8	4.9	6.8
	2.07	2.24	2.46	2.14	2.04	2.00	2.10	2.21	2.26	2.12	1.85	1.93	2.01
Freq	7.9	10.4	8.5	5.3	3.5	5.5	9.7	12.0	12.6	9.3	7.6	7.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.4	190	3.7	78	3.3	52	2.6	25
25	5.9	241	4.5	123	4.0	91	3.4	54
50	6.3	292	5.2	169	4.7	132	4.1	87
100	6.8	383	6.2	267	5.7	206	4.9	136
200	7.5	547	7.7	537	7.0	401	6.0	256

Reims

49° 18′ 00″ N 04° 02′ 00″ E	UTM 31 E 575128 m N 5461428 m	99 m a.s.l.

Location about 5 km N of the centre of Reims. The city extends to 2 km from the site in the sector SE to SW. The landscape appears relatively open and gently rolling with small villages, small forests and small rivers with trees and bushes along the river banks.
The anemometer is placed SW of the runways with airport buildings appearing close by in the SE sector and farther away in the NW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.20	2500	0.15							-3	
30	0.01	1750	0.07									-16	
60	0.01	2500	0.07									-6	
90	0.07											-8	
120	0.07												
150	0.07	2000	0.15	3000	0.40								
180	0.07	2000	0.60										
210	0.07	2000	0.45										
240	0.07	2300	0.25										
270	0.07												
300	0.03	500	0.07										
330	0.03	500	0.25	1500	0.20								

Height of anemometer: 11.5 m a.g.l. Period: 70010103-78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.7	138	131	178	169	160	105	57	38	13	10	1	0	0	0	4.0	1.90
30	7.5	165	191	214	144	88	73	57	33	19	13	2	0	0	0	3.4	1.42
60	5.5	236	224	221	137	87	46	28	10	4	4	2	0	0	0	2.8	1.45
90	6.0	190	178	222	178	117	72	29	7	3	3	0	0	0	0	3.2	1.78
120	4.7	196	187	214	160	99	69	45	20	5	4	1	0	0	0	3.2	1.58
150	8.3	131	130	172	188	155	102	59	25	22	14	0	0	0	0	4.1	1.89
180	7.9	137	110	141	144	133	123	85	58	27	31	7	2	0	0	4.7	1.80
210	11.6	90	109	138	148	140	106	94	69	45	43	15	1	1	0	5.1	1.79
240	14.3	87	118	161	161	139	104	78	58	39	38	13	4	1	0	4.8	1.66
270	9.0	112	118	152	165	135	121	75	52	30	30	9	0	0	0	4.6	1.75
300	7.4	137	148	195	185	126	83	50	34	20	16	4	2	0	0	3.9	1.60
330	9.3	107	145	228	215	151	77	40	18	8	8	0	0	0	0	3.7	1.94
Total	100.0	133	142	181	167	132	94	62	40	23	21	6	1	0	0	4.1	1.63

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.0	3.8	3.4	3.0	2.4	2.2	2.1	2.1	2.3	2.7	3.8	3.7	3.0
3	3.9	3.9	3.5	3.1	2.4	2.1	2.0	2.0	2.4	2.6	3.7	3.6	2.9
6	4.0	3.8	3.4	3.0	2.5	2.4	2.1	2.0	2.4	2.6	3.7	3.6	3.0
9	4.1	4.3	4.2	4.4	3.9	3.6	3.4	3.2	3.6	3.4	4.0	3.7	3.8
12	4.8	5.1	5.0	5.3	4.4	4.2	4.2	3.9	4.5	4.1	4.9	4.3	4.6
15	4.5	4.8	5.1	5.3	4.5	4.4	4.4	4.1	4.4	4.0	4.4	4.0	4.5
18	4.2	3.9	4.0	4.2	3.7	3.7	3.7	3.2	3.0	3.2	3.9	3.8	3.7
21	4.1	3.9	3.5	3.2	2.7	2.6	2.5	2.4	2.7	2.9	3.8	3.7	3.2
Day	4.2	4.2	4.0	4.0	3.3	3.2	3.1	2.9	3.1	3.2	4.0	3.8	3.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	5.8	4.6	4.8	5.1	6.3	7.3	8.2	7.9	7.3	6.2	5.9	6.5
	2.24	1.87	1.61	1.89	1.94	2.10	2.06	2.06	1.96	2.00	1.92	2.14	1.85
25	6.6	6.4	5.1	5.3	5.5	6.8	8.0	9.0	8.6	7.9	6.8	6.4	7.1
	2.31	1.93	1.66	1.95	2.00	2.16	2.13	2.11	2.01	2.06	1.98	2.20	1.90
50	7.1	6.9	5.5	5.7	5.9	7.3	8.6	9.6	9.2	8.5	7.3	6.9	7.7
	2.37	1.98	1.70	2.01	2.06	2.22	2.18	2.17	2.06	2.12	2.03	2.26	1.95
100	7.7	7.5	5.9	6.1	6.4	8.0	9.3	10.4	9.9	9.3	7.9	7.5	8.3
	2.30	1.92	1.65	1.94	1.99	2.15	2.12	2.11	2.01	2.05	1.97	2.19	1.90
200	8.5	8.2	6.5	6.8	7.1	8.8	10.3	11.3	10.9	10.2	8.7	8.3	9.1
	2.17	1.82	1.56	1.84	1.88	2.03	2.00	2.01	1.92	1.94	1.86	2.08	1.81
Freq	8.9	7.9	6.2	5.8	5.2	7.0	8.1	10.3	13.3	10.9	7.9	8.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.0	2.9	3.6	3.5	4.5	5.3	5.8	5.4	4.9	4.1	4.1	4.5
	1.86	1.48	1.39	1.71	1.58	1.82	1.76	1.76	1.66	1.73	1.58	1.86	1.60
25	5.1	4.8	3.5	4.3	4.2	5.4	6.4	6.9	6.4	5.9	4.9	4.9	5.4
	2.01	1.60	1.49	1.85	1.70	1.97	1.90	1.87	1.77	1.86	1.71	2.01	1.71
50	5.9	5.6	4.1	5.0	4.8	6.3	7.4	7.9	7.4	6.9	5.7	5.7	6.3
	2.26	1.79	1.68	2.08	1.91	2.21	2.14	2.05	1.96	2.09	1.91	2.26	1.88
100	7.0	6.6	4.9	6.0	5.7	7.5	8.8	9.2	8.7	8.2	6.8	6.8	7.5
	2.40	1.91	1.78	2.21	2.03	2.36	2.28	2.20	2.09	2.23	2.04	2.40	2.01
200	8.7	8.2	6.1	7.4	7.1	9.3	10.9	11.2	10.6	10.2	8.4	8.4	9.2
	2.30	1.82	1.71	2.11	1.94	2.25	2.17	2.11	2.00	2.13	1.95	2.30	1.94
Freq	8.8	7.6	5.8	5.9	4.9	7.8	7.9	11.2	14.0	9.6	7.6	9.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.3	2.5	3.2	3.0	4.0	4.7	5.0	4.6	4.3	3.5	3.6	3.9
	1.86	1.42	1.44	1.76	1.58	1.86	1.77	1.77	1.64	1.75	1.58	1.90	1.60
25	4.6	4.2	3.1	4.0	3.7	4.9	5.8	6.2	5.7	5.3	4.3	4.4	4.9
	1.99	1.52	1.53	1.88	1.68	1.99	1.89	1.87	1.74	1.87	1.69	2.03	1.69
50	5.4	4.9	3.7	4.7	4.4	5.8	6.8	7.2	6.7	6.2	5.1	5.2	5.7
	2.20	1.67	1.69	2.08	1.86	2.20	2.09	2.02	1.90	2.07	1.87	2.25	1.85
100	6.4	5.9	4.4	5.6	5.3	6.9	8.1	8.5	7.9	7.4	6.1	6.2	6.8
	2.42	1.84	1.86	2.29	2.05	2.42	2.30	2.22	2.08	2.27	2.06	2.47	2.02
200	8.0	7.3	5.4	6.9	6.5	8.6	10.0	10.3	9.6	9.2	7.6	7.7	8.4
	2.32	1.76	1.78	2.19	1.96	2.32	2.20	2.14	2.00	2.17	1.97	2.36	1.96
Freq	8.7	7.4	5.6	5.9	4.8	8.2	7.9	11.5	14.2	9.1	7.4	9.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.6	2.0	2.5	2.5	3.2	3.7	3.9	3.6	3.3	2.8	2.8	3.1
	1.83	1.44	1.44	1.76	1.61	1.82	1.77	1.75	1.66	1.71	1.64	1.90	1.61
25	3.9	3.5	2.6	3.3	3.3	4.2	4.9	5.2	4.8	4.3	3.7	3.8	4.1
	1.94	1.53	1.53	1.86	1.70	1.93	1.88	1.84	1.75	1.82	1.73	2.01	1.69
50	4.7	4.2	3.2	4.1	4.0	5.1	6.0	6.2	5.8	5.2	4.4	4.5	5.0
	2.11	1.66	1.66	2.02	1.85	2.10	2.03	1.96	1.88	1.97	1.88	2.19	1.81
100	5.6	5.2	3.9	4.9	4.8	6.2	7.2	7.4	7.0	6.3	5.4	5.5	6.0
	2.40	1.88	1.88	2.30	2.10	2.38	2.31	2.20	2.13	2.25	2.14	2.49	2.04
200	6.9	6.3	4.8	6.0	5.9	7.5	8.7	8.9	8.4	7.7	6.6	6.7	7.3
	2.31	1.82	1.82	2.22	2.03	2.30	2.23	2.15	2.06	2.17	2.06	2.40	1.99
Freq	8.5	7.4	5.4	5.9	5.1	8.2	8.3	11.9	13.7	8.9	7.5	9.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.8	246	4.1	102	3.5	67	2.8	32
25	6.3	313	4.9	159	4.4	117	3.7	70
50	6.8	377	5.6	218	5.1	169	4.4	112
100	7.4	492	6.6	338	6.1	259	5.3	173
200	8.1	694	8.2	661	7.4	493	6.5	320

Saint Etienne

45° 32′ 00″ N	04° 18′ 00″ E	UTM 31	E 601509 m	N 5043116 m	402 m a.s.l.

Location in the NE part of the Massif Central, 50 km SW of Lyon and 15 km NW of the city of St. Etienne. The airport is situated at the S end of the N-S stretching Plain du Forez where the river Loire runs. The plain is bordered to the W by Monts du Forez reaching 1600 m; to the E by Monts du Lyonnais with heights of 1000 m and to the S by the eastern part of the Massif reaching up to approx. 1800 m. The rise from the valley floor begins about 4 km from the site in the sectors NE to SW. The plain extends approx. 10 km to the W. The landscape in the valley is characterized by many villages, small forested areas and many shelterbelts. The anemometer is placed W of the runways with nearby buildings in the sectors from NE to W.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	500	0.07	2000	0.30							-18	
30	0.01	750	0.15	3500	0.25							-26	
60	0.01	700	0.07	2500	0.30							-14	
90	0.01	600	0.20	2000	0.30							-24	
120	0.01	600	0.20	1700	0.40							-26	
150	0.03	200	0.10	2000	0.30							-1	
180	0.03	500	0.10	2000	0.30								
210	0.07	750	0.25										
240	0.07	750	0.40										
270	0.07	750	0.40	2500	0.25								
300	0.03	300	0.07	1000	0.25								
330	0.03	500	0.15										

Height of anemometer: 10.0 m a.g.l. Period: 75010103-84123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	13.9	149	186	189	170	139	82	44	23	13	4	0	0	0	0	3.6	1.76
30	5.3	341	227	177	113	77	28	19	10	6	2	0	0	1	0	2.3	1.24
60	2.9	501	254	120	76	30	11	6	2	0	0	1	0	0	0	1.5	1.11
90	2.8	537	263	121	40	22	14	2	0	1	0	0	0	0	0	1.4	1.12
120	6.4	335	321	188	81	45	19	6	2	1	3	2	1	0	0	2.0	1.18
150	17.8	204	285	226	149	78	29	14	6	4	4	2	0	0	0	2.6	1.46
180	16.0	160	194	182	159	103	65	48	39	20	19	7	3	0	0	3.6	1.39
210	8.5	212	165	136	135	123	95	61	34	18	16	5	0	1	0	3.8	1.53
240	4.6	362	202	139	109	84	48	31	10	8	6	1	0	0	0	2.4	1.20
270	3.7	416	271	151	71	54	21	8	5	1	1	0	0	0	0	1.8	1.17
300	6.0	314	267	190	97	58	41	19	6	5	3	0	0	0	0	2.3	1.26
330	12.3	163	202	195	160	122	84	44	22	6	3	0	0	0	0	3.4	1.69
Total	100.0	241	229	183	135	93	54	31	18	9	7	2	1	0	0	2.9	1.35

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.3	2.3	2.4	2.0	1.8	1.5	1.4	1.5	2.0	2.2	2.5	2.6	2.0
3	2.3	2.4	2.4	2.0	1.8	1.5	1.5	1.4	2.0	2.1	2.4	2.6	2.0
6	2.4	2.3	2.4	1.8	1.8	1.5	1.5	1.3	1.8	2.0	2.3	2.5	2.0
9	2.6	2.7	2.9	3.1	2.8	2.5	2.5	2.1	2.3	2.6	2.3	2.7	2.6
12	3.0	3.5	3.8	4.0	3.5	3.2	3.4	3.0	3.1	3.3	3.0	3.2	3.3
15	3.2	3.5	3.9	4.4	3.6	3.8	3.7	3.5	3.3	3.3	3.1	3.0	3.5
18	2.6	2.7	2.9	3.4	3.3	3.2	3.6	2.9	2.5	2.5	2.7	2.6	2.9
21	2.5	2.4	2.3	2.1	2.0	1.7	1.7	1.5	1.8	2.2	2.5	2.5	2.1
Day	2.6	2.7	2.9	2.8	2.6	2.4	2.4	2.2	2.4	2.5	2.6	2.7	2.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.4	6.1	3.8	2.8	4.1	4.7	5.3	6.1	5.5	3.6	3.6	5.1	5.2
	1.98	1.81	1.31	1.29	1.35	1.65	1.59	1.69	1.60	1.31	1.43	1.86	1.58
25	7.0	6.7	4.2	3.0	4.5	5.1	5.9	6.7	6.0	3.9	4.0	5.5	5.7
	2.04	1.86	1.35	1.33	1.38	1.71	1.64	1.74	1.65	1.35	1.47	1.92	1.63
50	7.5	7.2	4.5	3.3	4.8	5.5	6.3	7.2	6.5	4.2	4.3	5.9	6.1
	2.09	1.91	1.38	1.36	1.42	1.75	1.69	1.78	1.69	1.39	1.51	1.97	1.67
100	8.1	7.8	4.9	3.5	5.2	5.9	6.8	7.8	7.0	4.6	4.6	6.4	6.6
	2.03	1.85	1.34	1.32	1.38	1.69	1.63	1.73	1.64	1.35	1.46	1.90	1.62
200	9.0	8.6	5.3	3.9	5.7	6.6	7.5	8.5	7.7	5.0	5.0	7.1	7.3
	1.92	1.75	1.27	1.25	1.31	1.61	1.55	1.64	1.55	1.28	1.38	1.81	1.54
Freq	13.1	8.9	4.0	2.8	4.8	12.9	17.1	11.6	6.2	4.1	5.0	9.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	3.8	2.2	1.9	2.9	3.2	3.9	4.3	3.3	2.3	2.6	3.7	3.6
	1.70	1.38	1.07	1.12	1.16	1.43	1.37	1.48	1.25	1.15	1.26	1.65	1.36
25	5.6	4.6	2.7	2.4	3.5	3.9	4.7	5.2	4.0	2.8	3.1	4.4	4.3
	1.84	1.48	1.15	1.21	1.25	1.54	1.48	1.59	1.35	1.23	1.36	1.77	1.46
50	6.5	5.4	3.2	2.8	4.1	4.5	5.5	6.1	4.7	3.3	3.7	5.1	5.0
	2.06	1.67	1.29	1.35	1.40	1.73	1.65	1.78	1.51	1.38	1.52	1.99	1.62
100	7.8	6.4	3.8	3.4	4.9	5.4	6.6	7.3	5.7	4.0	4.4	6.1	6.0
	2.20	1.77	1.37	1.43	1.49	1.84	1.76	1.90	1.60	1.46	1.62	2.12	1.71
200	9.6	8.0	4.7	4.2	6.1	6.7	8.2	9.0	7.0	4.9	5.5	7.6	7.4
	2.10	1.69	1.31	1.37	1.42	1.76	1.68	1.81	1.53	1.40	1.55	2.03	1.64
Freq	13.4	6.7	3.4	2.8	5.7	15.9	16.5	9.7	5.2	3.8	5.6	11.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.2	1.8	1.7	2.6	2.8	3.5	3.8	2.7	1.9	2.2	3.2	3.1
	1.74	1.32	1.07	1.14	1.20	1.44	1.37	1.50	1.23	1.14	1.24	1.67	1.36
25	5.2	3.9	2.2	2.2	3.2	3.5	4.3	4.8	3.4	2.4	2.8	4.0	3.9
	1.86	1.41	1.14	1.22	1.28	1.54	1.47	1.60	1.31	1.21	1.33	1.78	1.44
50	6.1	4.7	2.7	2.6	3.9	4.1	5.1	5.7	4.1	2.9	3.3	4.7	4.6
	2.06	1.56	1.26	1.34	1.41	1.70	1.62	1.77	1.44	1.34	1.47	1.97	1.58
100	7.3	5.6	3.2	3.2	4.7	4.9	6.2	6.8	4.9	3.5	4.0	5.7	5.5
	2.26	1.71	1.38	1.47	1.54	1.87	1.77	1.94	1.58	1.46	1.61	2.17	1.72
200	8.9	6.9	4.0	3.9	5.7	6.1	7.6	8.3	6.1	4.3	4.9	7.0	6.8
	2.17	1.63	1.32	1.41	1.48	1.78	1.70	1.86	1.51	1.40	1.54	2.07	1.65
Freq	13.5	5.9	3.2	2.8	6.0	17.1	16.3	8.9	4.8	3.8	5.8	11.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	2.2	1.3	1.4	2.0	2.2	2.8	3.1	2.0	1.6	1.9	2.6	2.4
	1.73	1.23	1.13	1.12	1.21	1.42	1.40	1.52	1.20	1.23	1.33	1.70	1.37
25	4.4	3.0	1.8	1.9	2.7	2.9	3.8	4.0	2.7	2.1	2.5	3.5	3.2
	1.83	1.29	1.19	1.18	1.27	1.51	1.49	1.60	1.26	1.29	1.40	1.79	1.44
50	5.3	3.7	2.2	2.3	3.3	3.6	4.6	4.9	3.3	2.6	3.1	4.2	4.0
	1.99	1.40	1.29	1.28	1.38	1.63	1.61	1.74	1.37	1.40	1.52	1.95	1.55
100	6.4	4.5	2.7	2.8	4.0	4.4	5.6	6.0	4.1	3.2	3.8	5.1	4.8
	2.27	1.59	1.46	1.45	1.57	1.86	1.83	1.98	1.55	1.59	1.73	2.22	1.73
200	7.8	5.4	3.2	3.4	4.9	5.3	6.8	7.3	4.9	3.8	4.6	6.2	5.9
	2.19	1.53	1.41	1.40	1.51	1.79	1.77	1.91	1.50	1.53	1.67	2.14	1.68
Freq	13.4	5.2	2.8	2.9	7.3	17.7	15.4	8.2	4.6	3.9	6.4	12.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.6	153	3.3	67	2.8	44	2.2	21
25	5.1	193	3.9	102	3.5	75	2.9	45
50	5.4	232	4.5	137	4.1	107	3.6	71
100	5.9	308	5.4	213	4.9	163	4.3	109
200	6.5	445	6.7	433	6.0	322	5.3	206

Saint Yan

46° 25′ 00″ N	04° 01′ 00″ E	UTM 31	E 578133 m	N 5140944 m	244 m a.s.l.

Located about 40 km N of the Massif Central in the valley of the River Loire. The terrain in the river plain (Plaines de la Loire et de l'Allier) is rolling and characterized by many villages, scattered forested areas and many shelterbelts. The airport is situated 2 km E of the river in flat terrain, but nearby to the E and 4 km to the W the terrain is undulating. The anemometer is placed E of the runway with airport buildings appearing close by in the SE sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	200	0.15	1500	0.30								
30	0.01	150	0.40	350	0.15	1300	0.30						
60	0.40	250	0.15	1000	0.35								
90	0.40	350	0.35										
120	0.30	250	0.07	1000	0.30								
150	0.30												
180	0.01	1000	0.07	2500	0.30								
210	0.01	1000	0.15	2000	0.30								
240	0.01	1000	0.30										
270	0.01	1200	0.30										
300	0.01	1600	0.25										
330	0.01	1200	0.20										

Height of anemometer: 10.7 m a.g.l. Period: 75010106–84123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.6	254	201	182	138	108	66	22	18	5	3	2	0	0	0	2.9	1.47
30	6.9	315	221	185	110	78	44	28	14	3	2	1	0	0	0	2.5	1.31
60	8.0	343	301	187	77	51	21	10	4	5	0	0	0	0	0	2.0	1.26
90	7.5	439	343	152	50	11	4	1	0	0	0	0	0	0	0	1.5	1.47
120	5.1	508	341	104	37	7	1	1	0	0	0	0	0	0	0	1.3	1.40
150	6.2	442	329	124	48	26	13	6	2	4	4	2	1	0	0	1.6	1.00
180	10.5	294	238	154	95	66	47	36	22	19	18	8	1	2	0	2.7	1.05
210	10.1	252	194	151	128	92	68	38	25	22	20	6	1	1	1	3.2	1.23
240	7.5	273	152	168	123	91	71	53	33	17	15	2	1	0	0	3.2	1.33
270	8.5	243	147	133	117	113	86	65	39	25	23	6	0	1	0	3.8	1.44
300	10.0	196	142	161	152	127	98	52	34	15	16	6	0	0	0	3.8	1.59
330	11.1	197	166	178	161	127	84	43	25	8	8	1	0	0	0	3.5	1.65
Total	100.0	296	221	159	109	81	55	32	20	11	10	3	0	0	0	2.7	1.19

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.8	2.3	2.5	1.9	1.6	1.3	1.2	1.1	1.3	1.6	1.9	2.6	1.8
3	2.7	2.2	2.6	1.6	1.6	1.1	1.1	1.0	1.3	1.6	1.9	2.4	1.8
6	2.6	2.3	2.1	1.7	1.6	1.3	1.4	1.0	1.3	1.6	1.9	2.2	1.8
9	2.7	2.7	3.3	3.4	3.0	2.7	2.6	2.3	2.1	2.2	2.1	2.5	2.6
12	3.6	3.6	4.3	4.2	3.6	3.5	3.4	3.2	3.1	3.0	3.0	3.3	3.5
15	3.4	3.6	4.4	4.4	3.8	3.7	3.7	3.4	3.1	3.0	2.9	3.1	3.5
18	2.8	2.4	2.9	3.2	2.6	2.8	3.0	2.3	1.9	2.0	2.2	2.4	2.5
21	2.9	2.4	2.5	2.3	1.8	1.4	1.4	1.0	1.5	1.8	2.1	2.6	2.0
Day	2.9	2.7	3.1	2.8	2.5	2.2	2.3	1.9	2.0	2.1	2.2	2.6	2.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	4.9	4.2	3.5	2.8	2.9	3.8	4.5	4.8	5.4	5.6	5.3	4.5
	1.80	1.62	1.49	1.54	1.62	1.16	1.19	1.33	1.49	1.64	1.80	1.92	1.47
25	5.6	5.4	4.7	3.8	3.0	3.2	4.2	5.0	5.3	5.9	6.1	5.8	4.9
	1.86	1.66	1.54	1.59	1.67	1.19	1.23	1.37	1.54	1.69	1.86	1.98	1.52
50	6.0	5.8	5.0	4.1	3.3	3.5	4.5	5.3	5.7	6.4	6.6	6.2	5.3
	1.90	1.71	1.58	1.63	1.71	1.23	1.25	1.41	1.58	1.74	1.91	2.03	1.55
100	6.5	6.3	5.4	4.4	3.5	3.7	4.9	5.8	6.2	6.9	7.2	6.7	5.8
	1.85	1.65	1.53	1.58	1.66	1.19	1.22	1.37	1.52	1.68	1.85	1.97	1.51
200	7.2	6.9	5.9	4.9	3.9	4.1	5.3	6.3	6.8	7.6	7.9	7.4	6.3
	1.75	1.57	1.45	1.50	1.57	1.13	1.15	1.29	1.45	1.59	1.75	1.86	1.44
Freq	9.5	7.6	7.4	7.6	6.3	5.7	8.8	10.4	8.6	8.1	9.4	10.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.3	2.8	2.3	1.8	2.0	2.6	3.2	3.3	3.8	3.8	3.6	3.1
	1.48	1.32	1.27	1.36	1.38	0.98	1.03	1.18	1.29	1.41	1.56	1.62	1.26
25	4.3	4.0	3.4	2.7	2.2	2.5	3.2	3.9	4.1	4.6	4.6	4.3	3.7
	1.59	1.42	1.37	1.47	1.49	1.05	1.11	1.27	1.39	1.52	1.68	1.75	1.35
50	5.0	4.7	4.0	3.2	2.6	3.0	3.8	4.6	4.8	5.4	5.4	5.0	4.4
	1.79	1.59	1.53	1.64	1.67	1.17	1.23	1.42	1.56	1.70	1.88	1.97	1.51
100	5.9	5.6	4.7	3.8	3.0	3.6	4.6	5.5	5.7	6.5	6.4	5.9	5.3
	1.90	1.69	1.63	1.75	1.77	1.24	1.31	1.51	1.65	1.81	2.01	2.10	1.60
200	7.4	6.9	5.9	4.8	3.8	4.5	5.7	6.8	7.1	8.0	8.0	7.4	6.5
	1.82	1.62	1.56	1.67	1.69	1.19	1.25	1.44	1.58	1.73	1.92	2.00	1.53
Freq	8.9	7.2	7.7	7.5	5.7	5.9	10.0	10.2	7.9	8.4	9.8	10.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.9	2.4	2.0	1.5	1.8	2.4	2.9	3.0	3.4	3.4	3.1	2.7
	1.46	1.31	1.26	1.40	1.36	0.99	1.05	1.22	1.33	1.42	1.57	1.63	1.27
25	3.8	3.6	3.0	2.4	1.9	2.3	3.0	3.6	3.7	4.2	4.2	3.8	3.4
	1.56	1.40	1.35	1.49	1.45	1.05	1.12	1.30	1.42	1.52	1.68	1.75	1.35
50	4.6	4.3	3.5	2.9	2.3	2.8	3.6	4.3	4.4	5.0	4.9	4.5	4.0
	1.73	1.55	1.49	1.65	1.60	1.15	1.23	1.43	1.57	1.68	1.86	1.93	1.48
100	5.5	5.1	4.3	3.5	2.7	3.4	4.3	5.2	5.3	6.0	5.9	5.4	4.8
	1.89	1.70	1.63	1.81	1.76	1.26	1.35	1.57	1.72	1.84	2.04	2.12	1.62
200	6.7	6.3	5.2	4.3	3.3	4.2	5.3	6.4	6.5	7.4	7.3	6.7	6.0
	1.81	1.63	1.56	1.73	1.68	1.21	1.29	1.51	1.65	1.76	1.95	2.03	1.55
Freq	8.6	7.0	7.9	7.5	5.4	6.1	10.4	10.1	7.7	8.4	9.9	11.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.2	1.9	1.5	1.2	1.5	1.9	2.3	2.4	2.7	2.6	2.4	2.1
	1.47	1.29	1.27	1.46	1.29	1.02	1.06	1.24	1.35	1.45	1.59	1.63	1.28
25	3.3	2.9	2.5	2.0	1.6	2.1	2.5	3.1	3.2	3.6	3.5	3.2	2.8
	1.55	1.36	1.35	1.54	1.37	1.07	1.12	1.31	1.42	1.53	1.69	1.73	1.35
50	4.0	3.6	3.0	2.4	1.9	2.6	3.1	3.8	3.8	4.3	4.2	3.9	3.5
	1.69	1.48	1.46	1.67	1.48	1.16	1.21	1.42	1.54	1.66	1.83	1.88	1.45
100	4.8	4.4	3.7	2.9	2.3	3.2	3.9	4.6	4.7	5.3	5.1	4.7	4.2
	1.92	1.67	1.66	1.90	1.68	1.31	1.37	1.61	1.76	1.89	2.08	2.13	1.63
200	5.9	5.4	4.5	3.6	2.9	3.9	4.7	5.7	5.7	6.4	6.3	5.8	5.2
	1.85	1.62	1.60	1.83	1.62	1.26	1.32	1.55	1.69	1.82	2.01	2.06	1.58
Freq	8.4	6.9	7.9	7.5	5.1	6.7	10.4	9.9	7.6	8.6	10.1	10.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.1	115	2.9	52	2.5	34	2.0	16
25	4.5	145	3.4	79	3.1	58	2.6	35
50	4.8	174	4.0	103	3.6	81	3.2	54
100	5.2	231	4.7	159	4.3	122	3.8	81
200	5.7	337	5.9	325	5.4	242	4.6	155

Toul

48° 47′ 00″ N	05° 59′ 00″ E	UTM 31	E 719150 m	N 5407771 m	298 m a.s.l.

Location in eastern France 15 km NW of the city of Nancy. The landscape is rolling and has many forested areas. The anemometer is placed W of the runways of the aerodrome with large buildings close by in the W, NW and N sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	150	0.35										
30	0.01	1500	0.07	3000	0.35								
60	0.01	1250	0.15										
90	0.01	1250	0.05	2500	0.35								
120	0.01	700	0.07	1300	0.60								
150	0.01	1000	0.60										
180	0.01	1250	0.15										
210	0.01	1600	0.20										
240	0.01	150	0.15	1000	0.30								
270	0.01	150	0.60	2000	0.15								
300	0.01	100	0.50	2500	0.20								
330	0.01	100	0.50	2500	0.30								

Height of anemometer: 12.0 m a.g.l. Period: 75021300-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.4	161	212	273	175	86	47	22	15	4	1	1	1	0	0	3.0	1.63
30	13.2	55	113	192	191	174	118	69	36	23	22	7	1	0	0	4.5	1.87
60	13.9	63	76	159	176	184	131	68	55	36	39	12	2	0	0	5.0	1.89
90	4.5	119	160	176	187	151	68	59	35	21	25	0	0	0	0	4.0	1.71
120	2.3	232	193	263	162	76	37	21	9	3	0	0	0	0	3	2.9	1.44
150	3.3	211	187	240	137	102	63	33	13	4	4	4	0	0	0	3.0	1.47
180	9.8	134	177	184	153	107	78	62	45	23	25	7	3	2	0	3.9	1.43
210	16.4	100	163	170	127	122	94	72	55	42	41	11	4	0	0	4.5	1.57
240	13.2	107	172	202	165	124	95	52	35	18	21	6	2	0	0	3.9	1.56
270	8.6	121	217	253	194	97	63	32	13	3	5	0	0	0	0	3.2	1.72
300	5.6	167	219	293	176	95	23	15	8	4	1	0	0	0	0	2.9	1.82
330	3.9	211	231	316	154	68	15	6	0	0	0	0	0	0	0	2.6	2.08
Total	100.0	114	161	207	166	128	85	53	35	21	22	6	2	0	0	3.9	1.54

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.3	3.9	3.6	3.2	3.2	2.5	2.0	2.0	2.1	2.4	3.3	3.9	3.0
3	4.2	4.1	3.6	3.0	3.0	2.5	2.0	2.0	2.1	2.5	3.2	3.8	3.0
6	4.1	4.0	3.6	3.0	3.5	3.0	2.3	2.3	2.1	2.6	3.2	4.1	3.1
9	4.2	4.3	4.5	4.4	4.5	4.0	3.3	3.4	3.4	3.4	3.7	4.3	3.9
12	4.8	4.8	5.2	4.8	4.9	4.4	3.7	3.8	4.0	4.1	4.4	4.7	4.4
15	4.3	4.5	4.8	4.9	4.7	4.3	3.7	3.8	3.8	3.7	3.9	4.1	4.2
18	4.0	3.8	3.8	3.7	3.7	3.7	2.8	2.8	2.4	2.7	3.5	4.0	3.4
21	3.9	3.9	3.6	3.2	3.2	2.6	2.1	2.3	2.2	2.5	3.4	3.8	3.0
Day	4.2	4.2	4.1	3.8	3.8	3.4	2.7	2.8	2.8	3.0	3.6	4.1	3.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	6.3	6.8	6.5	5.1	4.6	5.5	6.3	6.6	6.5	6.0	5.4	6.2
	1.98	2.13	2.18	2.12	1.77	1.70	1.68	1.79	1.81	1.89	2.03	2.21	1.90
25	6.2	6.9	7.4	7.1	5.6	5.1	6.1	6.8	7.3	7.2	6.6	5.9	6.8
	2.04	2.20	2.25	2.19	1.83	1.75	1.73	1.85	1.87	1.95	2.09	2.28	1.96
50	6.6	7.4	7.9	7.6	6.0	5.4	6.5	7.4	7.8	7.7	7.1	6.4	7.3
	2.09	2.26	2.31	2.24	1.88	1.79	1.77	1.90	1.92	2.00	2.15	2.34	2.01
100	7.2	8.0	8.6	8.2	6.5	5.9	7.1	8.0	8.5	8.4	7.7	6.9	7.9
	2.03	2.19	2.24	2.17	1.82	1.74	1.72	1.84	1.86	1.94	2.08	2.27	1.95
200	7.9	8.9	9.5	9.1	7.1	6.5	7.8	8.8	9.3	9.2	8.4	7.7	8.7
	1.92	2.07	2.12	2.06	1.73	1.65	1.63	1.74	1.76	1.83	1.97	2.15	1.85
Freq	4.8	10.2	13.7	8.2	3.2	2.9	7.1	13.7	14.3	10.4	6.9	4.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.4	4.8	4.2	3.3	3.2	3.8	4.4	4.7	4.4	4.1	3.7	4.3
	1.62	1.82	1.85	1.73	1.42	1.42	1.42	1.53	1.53	1.63	1.73	1.93	1.60
25	4.8	5.3	5.8	5.1	3.9	3.9	4.6	5.3	5.6	5.3	4.9	4.5	5.2
	1.74	1.97	1.99	1.86	1.54	1.54	1.52	1.65	1.65	1.76	1.87	2.08	1.73
50	5.6	6.1	6.7	5.9	4.6	4.5	5.4	6.2	6.6	6.2	5.7	5.2	6.0
	1.96	2.21	2.24	2.09	1.72	1.72	1.71	1.85	1.85	1.97	2.10	2.34	1.94
100	6.6	7.3	7.9	7.0	5.5	5.4	6.4	7.3	7.8	7.4	6.8	6.1	7.2
	2.09	2.36	2.39	2.23	1.83	1.83	1.82	1.98	1.97	2.10	2.24	2.49	2.06
200	8.2	9.1	9.9	8.7	6.8	6.7	8.0	9.1	9.7	9.2	8.4	7.6	8.9
	1.99	2.25	2.28	2.13	1.75	1.75	1.74	1.88	1.88	2.00	2.13	2.38	1.97
Freq	5.2	12.2	13.8	5.9	2.6	3.1	8.8	15.4	13.4	9.3	6.1	4.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.9	4.2	3.6	2.8	2.9	3.3	3.9	4.1	3.9	3.5	3.2	3.8
	1.61	1.85	1.84	1.70	1.43	1.48	1.41	1.54	1.53	1.69	1.76	1.92	1.61
25	4.3	4.8	5.2	4.4	3.5	3.5	4.2	4.8	5.1	4.8	4.4	4.0	4.7
	1.73	1.98	1.97	1.81	1.53	1.58	1.51	1.65	1.64	1.81	1.88	2.06	1.72
50	5.1	5.6	6.1	5.2	4.1	4.2	4.9	5.7	6.0	5.7	5.1	4.6	5.5
	1.91	2.19	2.18	2.01	1.69	1.74	1.67	1.83	1.81	2.00	2.08	2.28	1.90
100	6.1	6.7	7.3	6.2	4.9	5.0	5.9	6.8	7.2	6.8	6.1	5.5	6.6
	2.10	2.41	2.40	2.20	1.85	1.92	1.83	2.01	1.99	2.20	2.29	2.50	2.08
200	7.5	8.3	9.0	7.7	6.1	6.2	7.3	8.4	8.9	8.4	7.6	6.8	8.1
	2.01	2.31	2.30	2.11	1.77	1.83	1.75	1.92	1.90	2.10	2.19	2.40	1.99
Freq	5.3	12.9	13.9	5.0	2.4	3.2	9.4	16.0	13.1	8.8	5.9	4.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.1	3.3	2.7	2.1	2.3	2.7	3.1	3.3	3.0	2.8	2.5	3.0
	1.66	1.86	1.85	1.68	1.38	1.42	1.45	1.56	1.54	1.71	1.80	1.99	1.62
25	3.7	4.1	4.4	3.6	2.8	3.0	3.6	4.1	4.3	4.0	3.7	3.3	3.9
	1.76	1.97	1.96	1.77	1.47	1.50	1.53	1.65	1.63	1.81	1.91	2.11	1.72
50	4.5	4.9	5.3	4.4	3.4	3.7	4.4	4.9	5.2	4.9	4.4	4.0	4.8
	1.91	2.14	2.13	1.93	1.59	1.63	1.66	1.79	1.77	1.97	2.07	2.29	1.86
100	5.5	5.9	6.4	5.3	4.1	4.5	5.3	6.0	6.3	5.9	5.3	4.8	5.8
	2.18	2.44	2.43	2.20	1.81	1.85	1.89	2.04	2.02	2.24	2.36	2.61	2.11
200	6.7	7.3	7.8	6.5	5.1	5.4	6.5	7.3	7.7	7.2	6.5	5.9	7.0
	2.10	2.35	2.34	2.12	1.74	1.79	1.82	1.97	1.95	2.16	2.28	2.51	2.03
Freq	6.2	13.2	13.2	4.3	2.4	3.8	10.3	15.8	12.8	8.5	5.5	4.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.5	205	3.9	86	3.4	57	2.7	27
25	6.0	261	4.6	134	4.2	99	3.5	59
50	6.5	316	5.3	184	4.9	143	4.2	95
100	7.0	416	6.3	289	5.8	222	5.1	147
200	7.8	595	7.9	582	7.2	433	6.2	278

Toulouse

43° 32′ 00″ N 01° 22′ 00″ E	UTM 31 E 368019 m N 4821426 m	166 m a.s.l.

Location in southern France, 50 km north of the foothills of the Pyrenées and 8 km SW of the centre of Toulouse. The terrain is flat to a distance of 10 km in all sectors except to the SE (5 km). The suburbs extend to the boundary of the aerodrome in most sectors. The anemometer is situated at the SE corner of the aerodrome with the airport buildings appearing more than 250 m away in the SW-W sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	700	0.30	3500	0.20								
30	0.01	800	0.30	2750	0.45								
60	0.01	900	0.20	2200	0.45								
90	0.01	350	0.07	2000	0.35								
120	0.01	200	0.10	2200	0.35							-7	
150	0.01	150	0.07	1100	0.30							-5	
180	0.07	2700	0.30										
210	0.07												
240	0.01	300	0.40	1000	0.30							-6	
270	0.01	500	0.30	3500	0.07							-3	
300	0.01	1600	0.30										
330	0.01	1000	0.30										

Height of anemometer: 11.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.5	276	229	245	133	69	27	12	5	3	1	0	0	0	0	2.5	1.58
30	2.4	463	231	171	99	23	9	1	1	1	0	0	0	0	0	1.7	1.31
60	2.3	431	250	174	102	28	7	3	3	0	1	0	0	0	0	1.8	1.32
90	3.8	314	176	170	110	69	54	37	26	19	21	2	1	0	0	2.8	1.17
120	10.1	111	91	110	142	143	127	101	63	48	43	14	5	0	1	5.3	1.86
150	8.9	149	148	161	143	147	114	60	43	16	13	4	0	0	0	4.1	1.78
180	7.2	260	333	262	94	33	11	5	1	0	0	0	0	0	0	2.1	1.69
210	7.8	265	352	286	78	15	4	0	0	0	0	0	0	0	0	2.0	1.98
240	7.7	189	244	214	144	92	57	27	14	12	6	0	0	0	0	3.0	1.46
270	19.1	70	80	138	172	160	136	96	65	37	37	6	2	0	0	5.1	2.02
300	17.6	81	88	137	163	165	141	94	60	38	26	4	1	0	0	5.0	2.10
330	8.5	151	176	195	166	131	80	46	26	13	14	3	0	0	0	3.6	1.61
Total	100.0	164	167	176	142	116	90	59	38	23	20	4	1	0	0	3.8	1.52

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.1	3.5	3.4	3.3	3.1	2.7	2.5	2.4	2.2	2.7	2.8	3.0	2.9
3	3.0	3.4	3.2	3.1	2.7	2.5	2.4	2.1	2.1	2.6	2.7	2.8	2.7
6	3.0	3.6	3.1	3.2	2.8	2.5	2.3	2.1	2.0	2.7	2.7	2.7	2.7
9	3.0	3.9	3.9	4.4	3.7	3.3	3.2	3.1	2.9	3.3	3.0	3.0	3.4
12	4.1	5.0	5.0	5.0	4.3	3.9	3.8	3.8	3.7	4.3	4.0	3.9	4.2
15	4.2	5.2	5.0	5.3	4.5	4.1	4.2	4.0	3.7	4.3	4.1	3.8	4.4
18	3.3	4.1	4.0	4.4	4.0	4.0	4.0	3.7	2.9	3.1	3.1	3.1	3.6
21	3.2	3.8	3.4	3.8	3.2	2.9	2.8	2.7	2.3	2.8	2.9	2.9	3.1
Day	3.3	4.1	3.9	4.1	3.5	3.2	3.2	3.0	2.7	3.2	3.2	3.1	3.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	3.2	2.7	4.1	8.6	8.1	4.8	3.2	4.3	7.5	7.5	6.4	6.2
	1.74	1.69	1.52	1.29	1.88	2.04	1.53	2.13	1.50	2.22	2.42	2.17	1.69
25	5.0	3.5	2.9	4.5	9.4	8.9	5.3	3.5	4.7	8.2	8.2	7.0	6.8
	1.80	1.74	1.57	1.33	1.92	2.09	1.58	2.20	1.54	2.29	2.49	2.24	1.72
50	5.4	3.8	3.1	4.8	10.1	9.5	5.7	3.8	5.0	8.8	8.8	7.5	7.3
	1.85	1.79	1.62	1.37	1.97	2.15	1.62	2.26	1.58	2.35	2.56	2.30	1.76
100	5.8	4.1	3.4	5.2	10.8	10.3	6.1	4.1	5.4	9.6	9.5	8.2	7.8
	1.79	1.73	1.56	1.33	1.94	2.10	1.57	2.18	1.54	2.27	2.48	2.23	1.73
200	6.4	4.6	3.7	5.7	11.7	11.2	6.7	4.6	6.0	10.6	10.6	9.0	8.6
	1.69	1.64	1.48	1.26	1.87	2.00	1.49	2.07	1.46	2.15	2.35	2.11	1.67
Freq	6.1	3.3	2.4	3.2	7.7	9.3	7.7	7.5	7.9	14.8	18.2	12.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.0	1.9	3.0	6.5	5.3	2.8	2.2	3.4	5.4	5.1	4.1	4.3
	1.47	1.33	1.29	1.13	1.78	1.74	1.34	1.81	1.35	1.95	2.05	1.69	1.49
25	3.4	2.4	2.2	3.6	7.6	6.3	3.3	2.7	4.1	6.5	6.1	4.9	5.1
	1.58	1.44	1.38	1.22	1.86	1.88	1.44	1.95	1.46	2.10	2.22	1.82	1.58
50	4.0	2.8	2.6	4.3	8.7	7.3	3.9	3.1	4.8	7.5	7.1	5.7	6.0
	1.78	1.61	1.55	1.36	1.99	2.11	1.61	2.19	1.63	2.37	2.49	2.05	1.71
100	4.8	3.4	3.2	5.2	9.9	8.7	4.7	3.7	5.7	8.9	8.4	6.8	7.1
	1.89	1.71	1.65	1.44	2.14	2.25	1.72	2.34	1.74	2.52	2.65	2.18	1.81
200	5.9	4.2	3.9	6.4	11.7	10.8	5.8	4.5	7.1	11.1	10.4	8.4	8.7
	1.81	1.63	1.58	1.38	2.07	2.15	1.64	2.23	1.66	2.40	2.53	2.08	1.77
Freq	5.1	2.7	2.3	3.6	9.1	9.1	7.4	7.7	7.7	17.6	17.9	9.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	1.6	1.6	2.7	5.7	4.4	2.2	1.9	3.1	4.8	4.4	3.4	3.7
	1.51	1.31	1.30	1.16	1.82	1.74	1.43	1.90	1.40	1.97	2.05	1.62	1.49
25	3.0	2.1	2.1	3.4	7.0	5.5	2.8	2.4	3.8	5.9	5.4	4.2	4.6
	1.61	1.40	1.39	1.23	1.90	1.86	1.52	2.03	1.49	2.11	2.20	1.74	1.57
50	3.5	2.5	2.4	4.0	8.1	6.5	3.3	2.8	4.6	6.9	6.4	5.0	5.4
	1.78	1.54	1.53	1.36	2.01	2.06	1.69	2.24	1.65	2.33	2.43	1.92	1.69
100	4.2	2.9	2.9	4.9	9.3	7.7	3.9	3.3	5.5	8.2	7.6	5.9	6.5
	1.96	1.69	1.68	1.49	2.20	2.26	1.85	2.47	1.81	2.56	2.67	2.11	1.81
200	5.2	3.6	3.6	6.0	11.0	9.5	4.8	4.1	6.7	10.2	9.4	7.3	7.9
	1.87	1.62	1.61	1.42	2.13	2.17	1.77	2.36	1.73	2.45	2.56	2.02	1.78
Freq	4.7	2.5	2.3	3.7	9.6	9.0	7.3	7.8	7.6	18.6	17.8	8.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	1.3	1.4	2.4	4.5	3.3	1.7	1.6	2.7	3.8	3.4	2.6	2.9
	1.51	1.31	1.22	1.20	1.83	1.70	1.71	1.73	1.53	2.01	2.04	1.60	1.51
25	2.4	1.7	1.9	3.2	5.8	4.3	2.2	2.1	3.6	4.9	4.5	3.4	3.9
	1.60	1.39	1.29	1.27	1.89	1.80	1.81	1.83	1.62	2.13	2.16	1.69	1.58
50	2.9	2.1	2.3	4.0	6.9	5.3	2.7	2.5	4.4	6.0	5.4	4.2	4.7
	1.74	1.51	1.39	1.37	1.99	1.96	1.96	1.98	1.76	2.31	2.35	1.84	1.67
100	3.5	2.5	2.8	4.9	8.2	6.4	3.3	3.1	5.3	7.2	6.6	5.0	5.7
	1.98	1.71	1.58	1.56	2.16	2.23	2.24	2.26	2.00	2.63	2.68	2.09	1.83
200	4.3	3.1	3.4	5.9	9.7	7.8	4.0	3.8	6.5	8.8	8.0	6.1	6.9
	1.91	1.65	1.52	1.50	2.16	2.15	2.15	2.18	1.93	2.53	2.58	2.02	1.81
Freq	4.3	2.4	2.4	4.1	10.1	8.9	7.3	7.6	8.6	19.2	16.9	8.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.5	235	3.9	96	3.4	64	2.7	30
25	6.0	300	4.6	151	4.1	111	3.5	66
50	6.5	361	5.3	209	4.9	162	4.2	106
100	7.0	469	6.3	321	5.8	247	5.1	166
200	7.7	656	7.8	624	7.1	467	6.2	303

Vichy

46° 10′ 00″ N	03° 24′ 00″ E	UTM 31	E 530881 m	N 5112740 m	251 m a.s.l.

Located in the valley of the River Allier at the N border of the Massif Central 5 km NNW of the city of Vichy where the plain of Limagne meets the Plaines de la Loire et de L'Allier. The first plain is bordered to the W by the Monts d'Auvergne with heights up to 1900 m and to the E by Monts du Forez reaching 1600 m. The plain is 30 km wide in the W-E direction. Distances to the foothills from the airport are approx. E: 10 km and W: 20 km. The landscape has a closed appearance due to many villages, forests and shelterbelts. The anemometer is placed E of the runways 75 m NW of the river. There are no obstacles within 250 m of the site.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	750	0.07										
30	0.01	300	0.25										
60	0.30												
90	0.15	1000	0.25										
120	0.07	500	0.25										
150	0.10	700	0.20	2500	0.40								
180	0.10	600	0.20	2500	0.30								
210	0.15	2000	0.30										
240	0.01	750	0.30										
270	0.01	500	0.20										
300	0.01	500	0.07	2000	0.20								
330	0.01	800	0.25										

Height of anemometer: 10.0 m a.g.l. Period: 77010103-85123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	11.9	159	196	238	185	109	59	30	13	7	4	1	0	0	0	3.2	1.68
30	8.5	180	218	241	185	93	47	21	11	2	1	0	0	0	0	3.0	1.76
60	4.3	271	243	225	150	67	27	13	3	0	1	0	0	0	0	2.5	1.61
90	2.6	493	225	145	71	44	18	1	0	1	0	0	0	0	0	1.6	1.18
120	2.0	571	251	107	45	16	4	2	2	0	2	0	0	0	0	1.2	1.03
150	6.2	280	246	209	122	56	37	26	13	5	2	2	1	0	0	2.5	1.28
180	19.5	153	282	271	136	73	38	22	14	6	3	1	0	0	0	2.8	1.49
210	16.0	204	299	227	115	63	41	25	19	3	4	0	0	0	0	2.6	1.36
240	8.2	247	225	165	107	88	70	44	31	14	8	1	0	0	0	3.0	1.30
270	5.9	253	184	144	131	109	78	46	30	14	9	3	1	0	0	3.3	1.41
300	6.8	242	181	145	138	129	83	45	19	9	7	2	0	0	0	3.3	1.54
330	8.0	190	207	180	164	120	72	36	19	9	1	0	0	0	0	3.3	1.67
Total	100.0	217	239	213	138	85	51	28	16	6	4	1	0	0	0	2.8	1.44

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.6	2.3	2.3	2.1	1.6	1.4	1.3	1.2	1.5	1.8	2.2	2.7	1.9
3	2.5	2.3	2.4	2.0	1.7	1.5	1.4	1.3	1.6	1.8	2.2	2.5	1.9
6	2.6	2.3	2.3	2.1	1.8	1.7	1.4	1.4	1.5	1.9	2.2	2.5	2.0
9	2.7	2.6	3.4	3.6	2.7	2.5	2.3	2.2	2.3	2.5	2.5	2.8	2.7
12	3.5	3.3	4.3	4.4	3.3	3.3	3.0	2.9	3.0	3.0	3.1	3.5	3.4
15	3.4	3.7	4.4	4.6	3.4	3.5	3.6	3.3	3.3	3.1	3.0	3.2	3.5
18	2.5	2.6	3.0	3.7	2.8	3.1	3.2	2.7	2.1	2.0	2.1	2.4	2.7
21	2.5	2.3	2.4	2.1	1.7	1.5	1.5	1.3	1.3	1.8	2.1	2.6	1.9
Day	2.8	2.7	3.1	3.1	2.4	2.3	2.2	2.1	2.1	2.2	2.4	2.8	2.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.7	4.8	4.0	2.5	4.2	4.9	4.8	4.6	4.8	5.1	5.0	4.7
	1.98	2.01	1.96	1.63	1.26	1.41	1.71	1.66	1.56	1.57	1.77	1.90	1.70
25	5.2	5.2	5.3	4.4	2.8	4.6	5.4	5.3	5.1	5.3	5.6	5.4	5.2
	2.04	2.07	2.03	1.68	1.30	1.46	1.76	1.71	1.61	1.62	1.82	1.97	1.75
50	5.6	5.6	5.7	4.7	3.0	5.0	5.8	5.7	5.5	5.7	6.0	5.9	5.6
	2.09	2.12	2.08	1.72	1.33	1.49	1.80	1.76	1.65	1.66	1.87	2.02	1.79
100	6.0	6.0	6.2	5.1	3.2	5.4	6.3	6.1	5.9	6.2	6.5	6.3	6.0
	2.03	2.06	2.01	1.67	1.29	1.45	1.75	1.70	1.60	1.61	1.81	1.96	1.74
200	6.6	6.7	6.8	5.6	3.5	5.9	6.9	6.8	6.5	6.8	7.2	7.0	6.6
	1.92	1.95	1.90	1.58	1.23	1.37	1.65	1.61	1.52	1.52	1.72	1.85	1.65
Freq	10.3	9.9	6.1	3.3	2.3	4.4	13.7	17.5	11.8	6.9	6.4	7.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.4	3.4	2.4	1.7	3.0	3.4	3.3	3.2	3.5	3.5	3.4	3.3
	1.67	1.70	1.61	1.25	1.08	1.25	1.46	1.37	1.30	1.37	1.51	1.62	1.43
25	3.9	4.1	4.1	2.9	2.0	3.7	4.1	4.0	3.8	4.2	4.2	4.1	3.9
	1.80	1.84	1.73	1.35	1.16	1.35	1.58	1.47	1.40	1.47	1.62	1.75	1.54
50	4.5	4.7	4.8	3.4	2.4	4.3	4.8	4.6	4.5	4.9	4.9	4.8	4.6
	2.02	2.06	1.95	1.51	1.30	1.51	1.77	1.65	1.56	1.65	1.82	1.96	1.73
100	5.3	5.6	5.6	4.0	2.9	5.2	5.7	5.5	5.4	5.8	5.9	5.7	5.5
	2.15	2.20	2.07	1.61	1.38	1.60	1.88	1.75	1.67	1.76	1.94	2.09	1.84
200	6.7	6.9	7.0	5.0	3.6	6.4	7.1	6.8	6.7	7.2	7.3	7.1	6.8
	2.06	2.10	1.98	1.54	1.32	1.53	1.80	1.67	1.59	1.68	1.85	2.00	1.76
Freq	11.4	8.9	4.9	2.9	2.1	5.5	17.2	16.6	9.7	6.3	6.7	7.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.0	3.0	1.9	1.4	2.7	3.0	2.9	2.8	3.1	3.1	3.0	2.9
	1.70	1.75	1.61	1.21	1.04	1.26	1.45	1.36	1.31	1.39	1.52	1.64	1.44
25	3.5	3.7	3.7	2.4	1.7	3.4	3.7	3.6	3.5	3.8	3.8	3.7	3.6
	1.81	1.87	1.72	1.29	1.11	1.35	1.55	1.45	1.40	1.49	1.63	1.76	1.53
50	4.1	4.3	4.3	2.9	2.1	4.0	4.3	4.2	4.2	4.5	4.5	4.4	4.2
	2.01	2.07	1.90	1.42	1.22	1.49	1.71	1.60	1.55	1.64	1.80	1.94	1.69
100	4.9	5.2	5.2	3.4	2.5	4.8	5.2	5.1	5.0	5.4	5.4	5.3	5.0
	2.20	2.27	2.08	1.56	1.33	1.63	1.88	1.76	1.70	1.80	1.98	2.13	1.86
200	6.1	6.4	6.4	4.2	3.1	5.9	6.4	6.2	6.1	6.7	6.6	6.5	6.2
	2.11	2.17	2.00	1.49	1.28	1.56	1.80	1.68	1.63	1.73	1.89	2.04	1.78
Freq	11.7	8.6	4.5	2.8	2.1	5.9	18.5	16.2	9.0	6.1	6.8	7.9	100.0

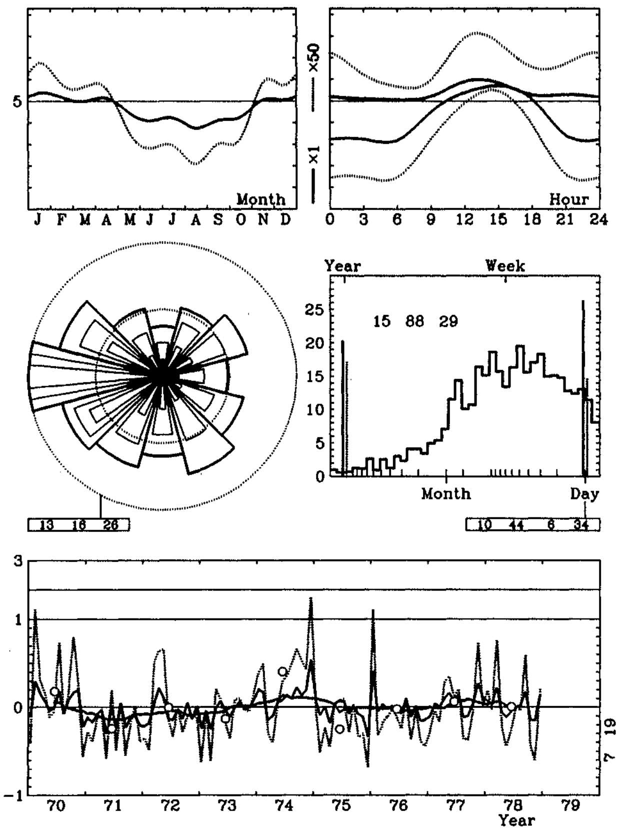
Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.4	2.3	1.4	1.2	2.2	2.4	2.3	2.2	2.5	2.4	2.3	2.3
	1.65	1.74	1.56	1.18	1.04	1.30	1.49	1.35	1.31	1.42	1.54	1.64	1.44
25	2.9	3.1	3.1	1.9	1.6	2.9	3.1	3.0	2.9	3.3	3.2	3.1	3.0
	1.75	1.84	1.65	1.24	1.10	1.37	1.58	1.43	1.38	1.50	1.63	1.73	1.53
50	3.5	3.8	3.7	2.3	2.0	3.5	3.8	3.6	3.6	4.0	3.9	3.8	3.6
	1.90	2.00	1.79	1.35	1.19	1.49	1.71	1.55	1.50	1.63	1.77	1.88	1.65
100	4.3	4.6	4.5	2.8	2.5	4.3	4.6	4.4	4.4	4.8	4.7	4.5	4.4
	2.17	2.28	2.05	1.52	1.35	1.69	1.95	1.76	1.71	1.85	2.02	2.14	1.88
200	5.2	5.6	5.5	3.4	3.0	5.2	5.6	5.4	5.3	5.9	5.7	5.5	5.4
	2.09	2.19	1.97	1.48	1.30	1.63	1.88	1.70	1.65	1.79	1.94	2.06	1.81
Freq	11.5	8.1	4.3	2.6	2.3	7.0	19.3	15.7	8.0	6.0	6.9	8.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.2	105	3.0	46	2.6	30	2.0	15
25	4.6	133	3.5	70	3.2	52	2.7	31
50	5.0	159	4.1	94	3.8	74	3.3	50
100	5.4	210	4.9	147	4.5	113	3.9	75
200	5.9	304	6.1	299	5.5	223	4.8	143

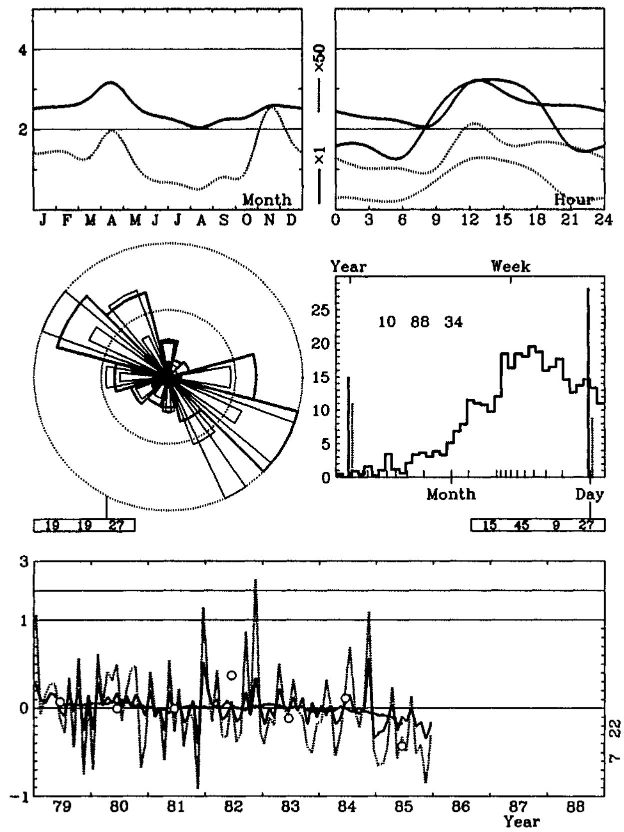
Abbeville, France 1970–78

11.0 m agl, mean 4.6 m/s, st dev 2.7 m/s, cube 221. m^3/s^3



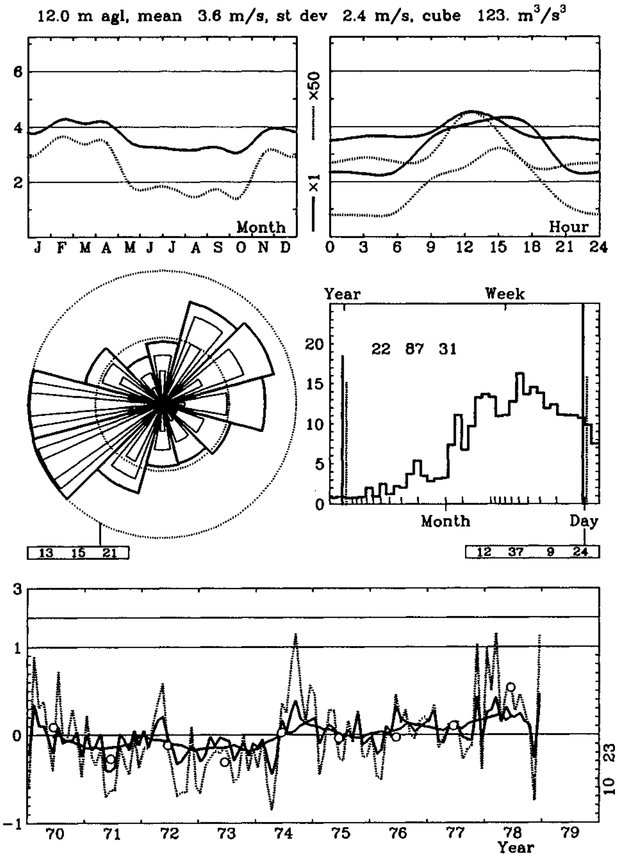
Aurillac, France 1979–85

11.0 m agl, mean 2.5 m/s, st dev 2.1 m/s, cube 63. m^3/s^3



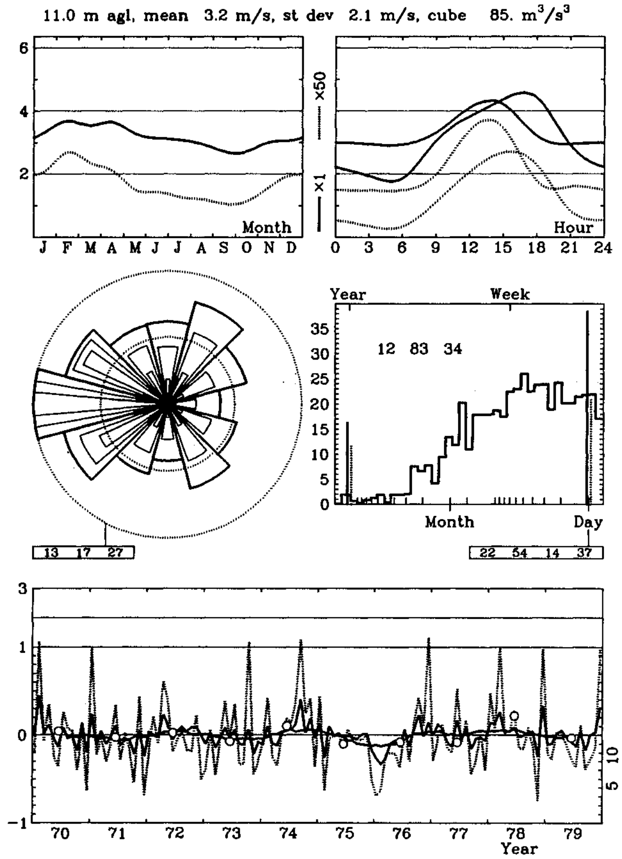
Avord, France 1970–78

12.0 m agl, mean 3.6 m/s, st dev 2.4 m/s, cube 123. m^3/s^3



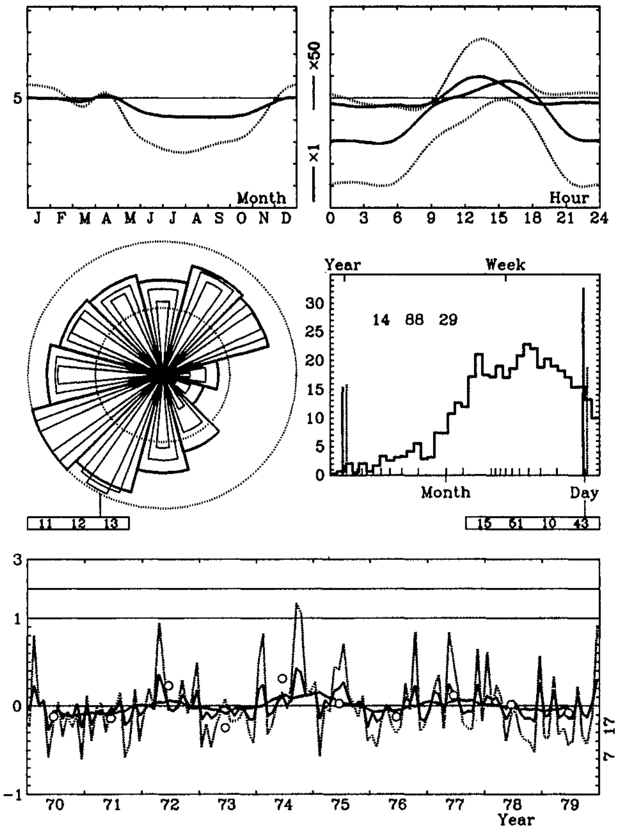
Bordeaux, France 1970–79

11.0 m agl, mean 3.2 m/s, st dev 2.1 m/s, cube 85. m^3/s^3



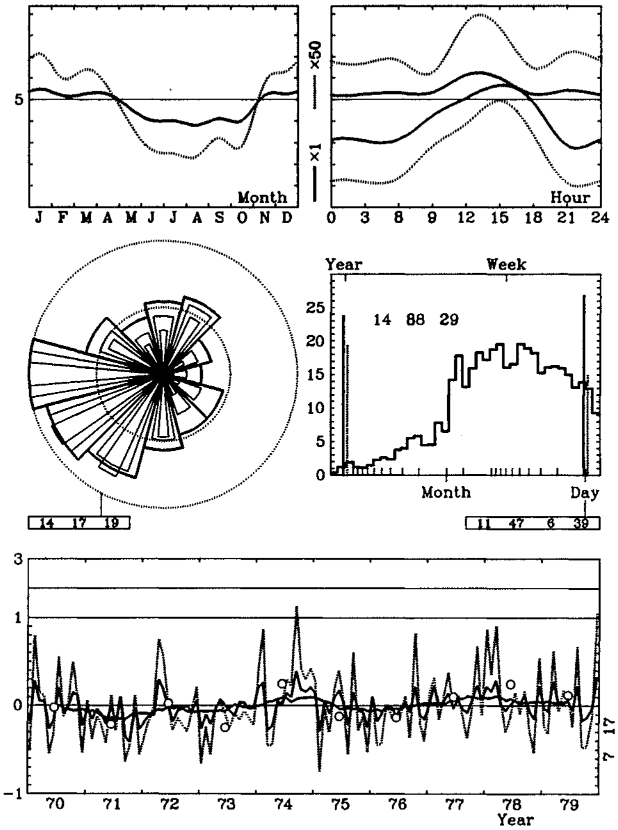
Brest, France 1970–79

10.0 m agl, mean 4.6 m/s, st dev 2.6 m/s, cube 201. m^3/s^3



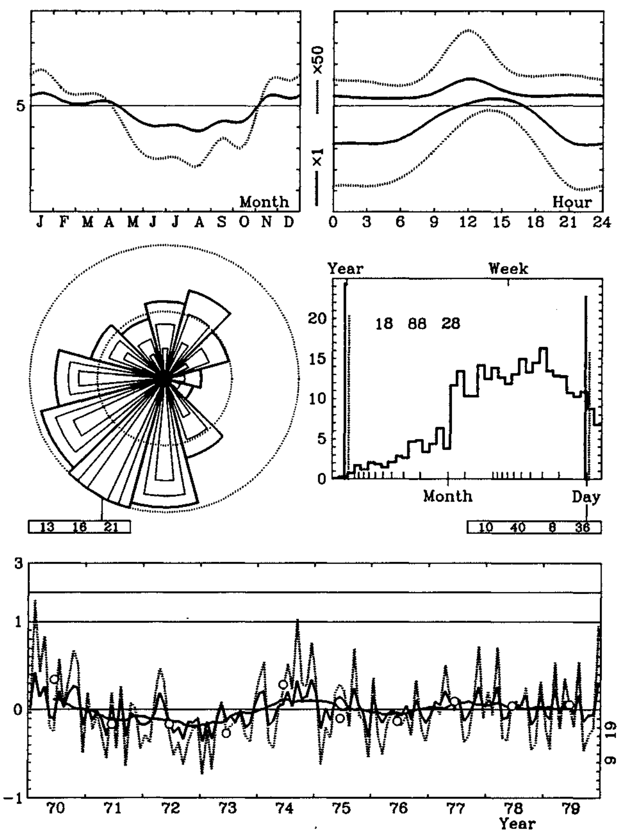
Caen, France 1970–79

12.0 m agl, mean 4.7 m/s, st dev 2.8 m/s, cube 227. m^3/s^3



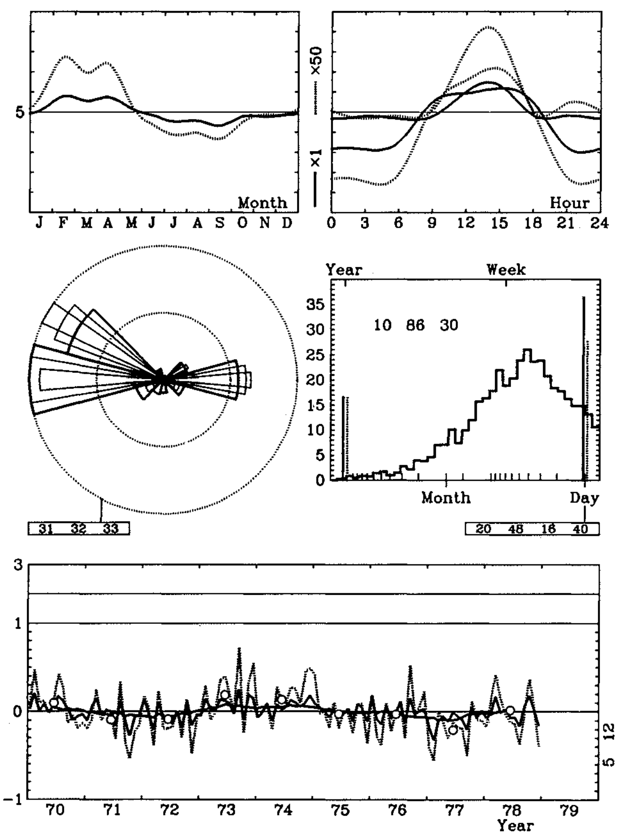
Cambrai, France 1970–79

10.0 m agl, mean 4.8 m/s, st dev 2.6 m/s, cube 219. m^3/s^3



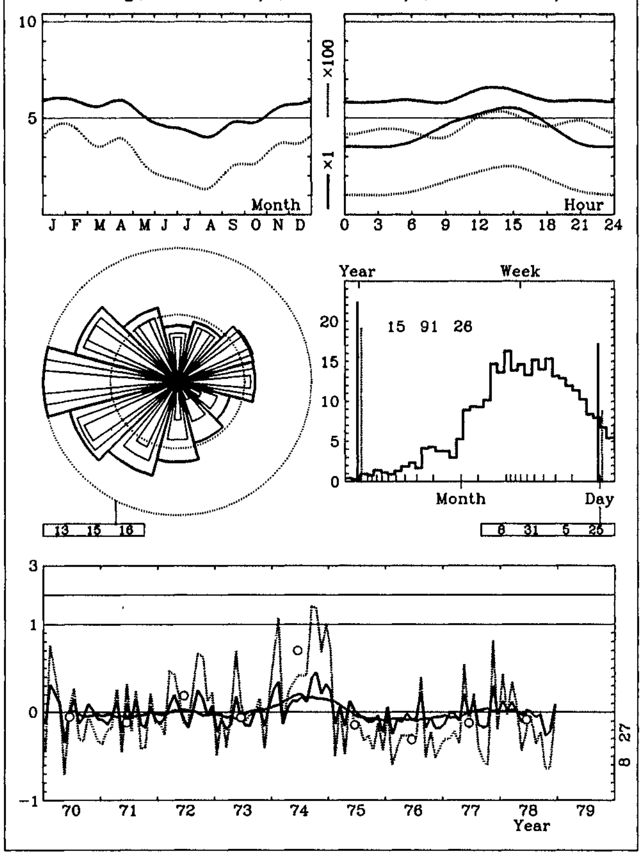
Carcassonne, France 1970–78

11.0 m agl, mean 5.0 m/s, st dev 2.9 m/s, cube 263. m^3/s^3



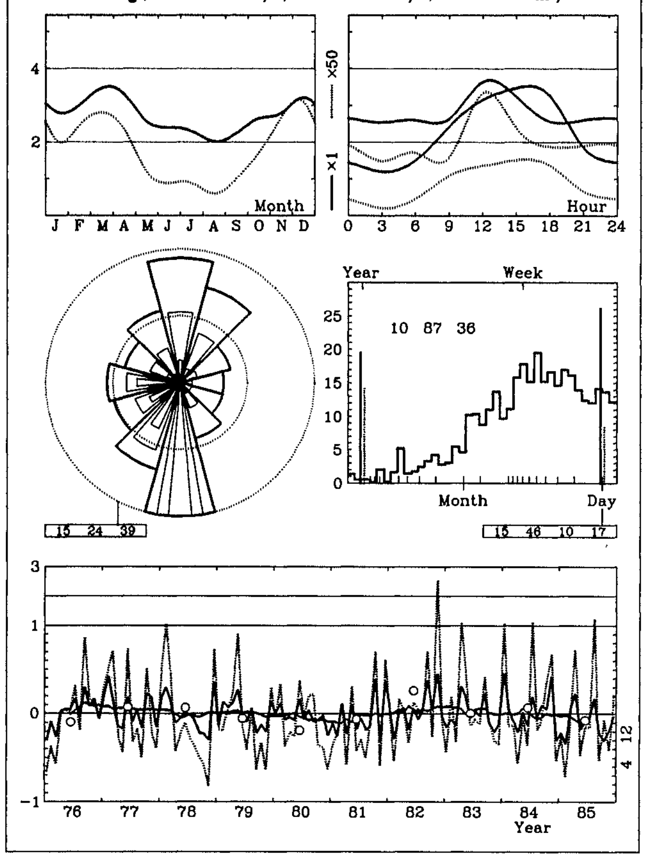
Cherbourg, France 1970–78

10.0 m agl, mean 5.2 m/s, st dev 3.1 m/s, cube 304. m^3/s^3



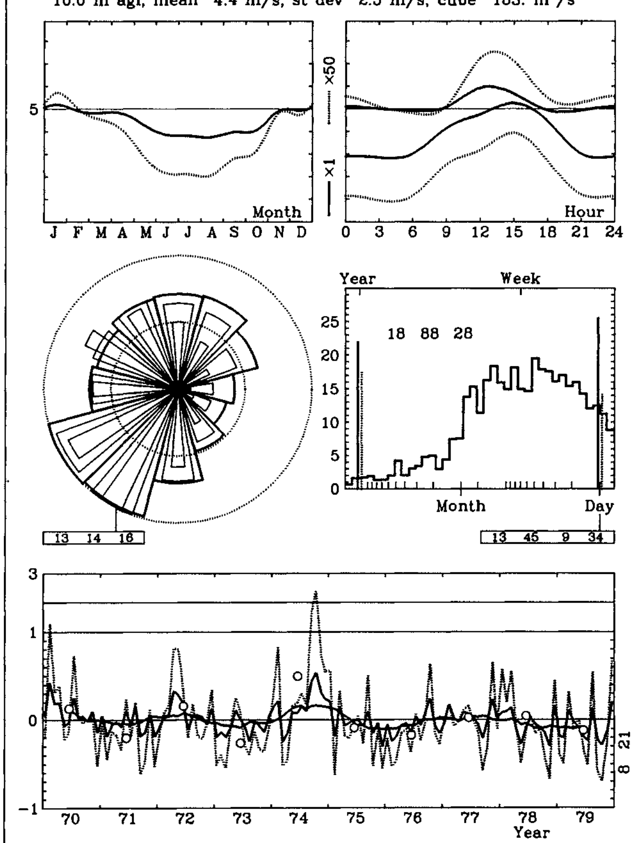
Clermont-Ferrand, France 1976–85

10.0 m agl, mean 2.7 m/s, st dev 2.4 m/s, cube 90. m^3/s^3



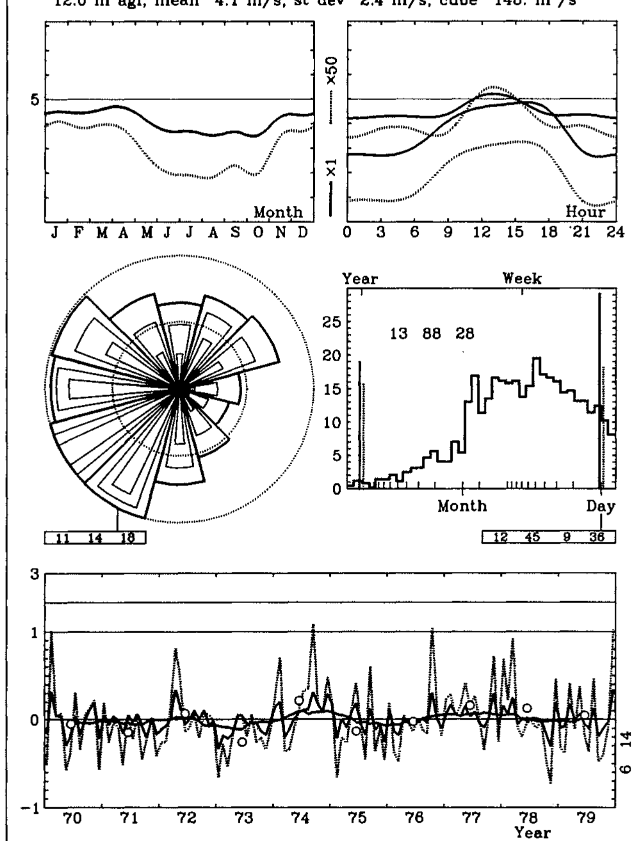
Dinard, France 1970–79

10.0 m agl, mean 4.4 m/s, st dev 2.5 m/s, cube 183. m^3/s^3



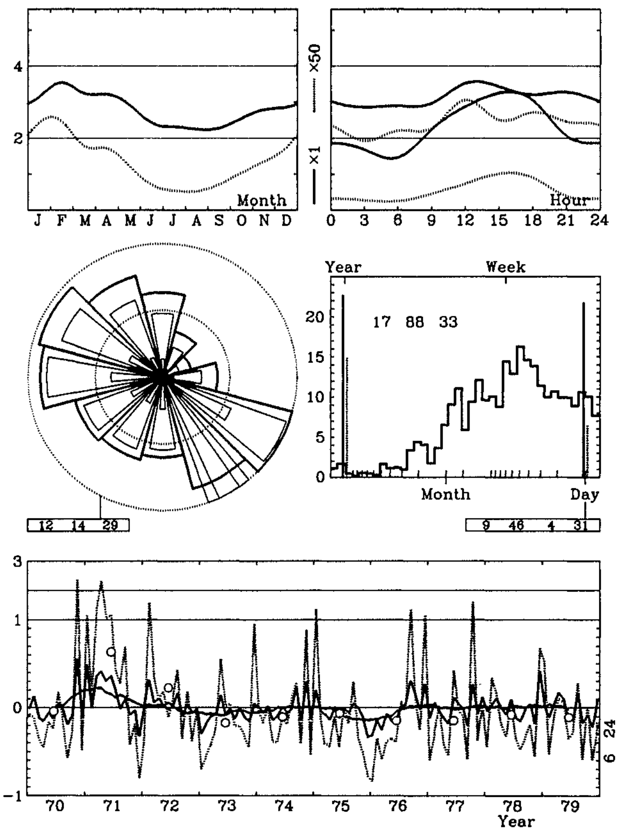
Evreux, France 1970–79

12.0 m agl, mean 4.1 m/s, st dev 2.4 m/s, cube 148. m^3/s^3



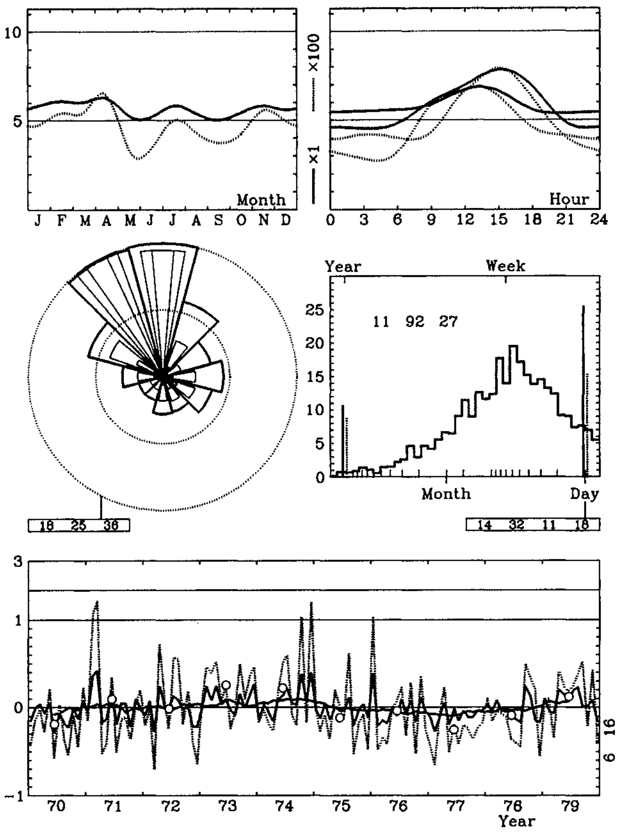
Gourdon, France 1970–79

11.0 m agl, mean 2.8 m/s, st dev 2.0 m/s, cube 67. m^3/s^3



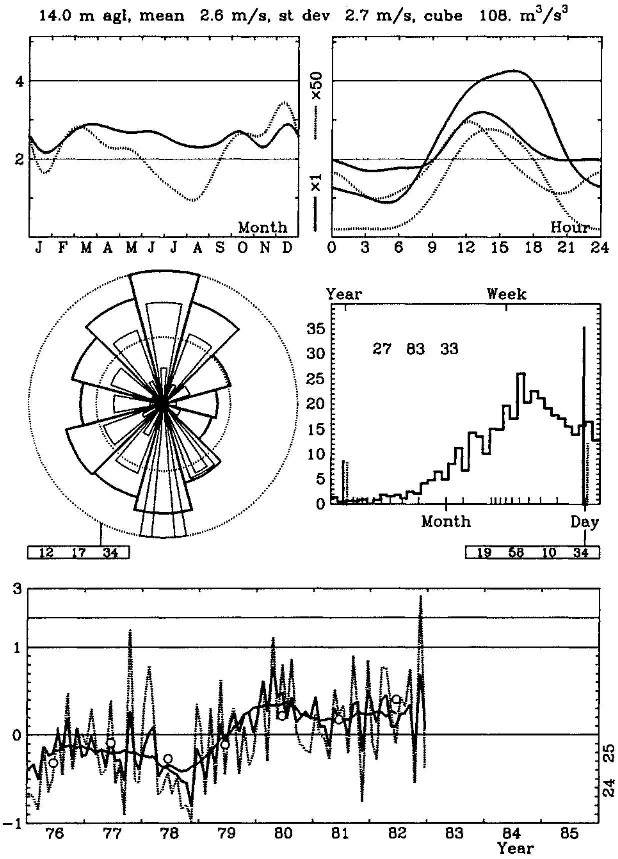
Istres, France 1970–79

10.0 m agl, mean 5.6 m/s, st dev 3.7 m/s, cube 472. m^3/s^3



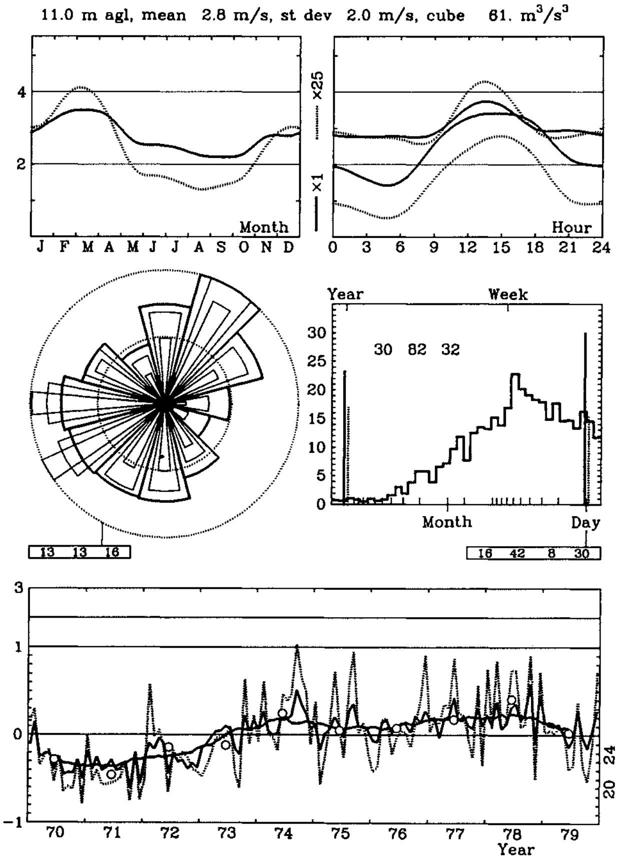
Le Puy Chadrac, France 1976–82

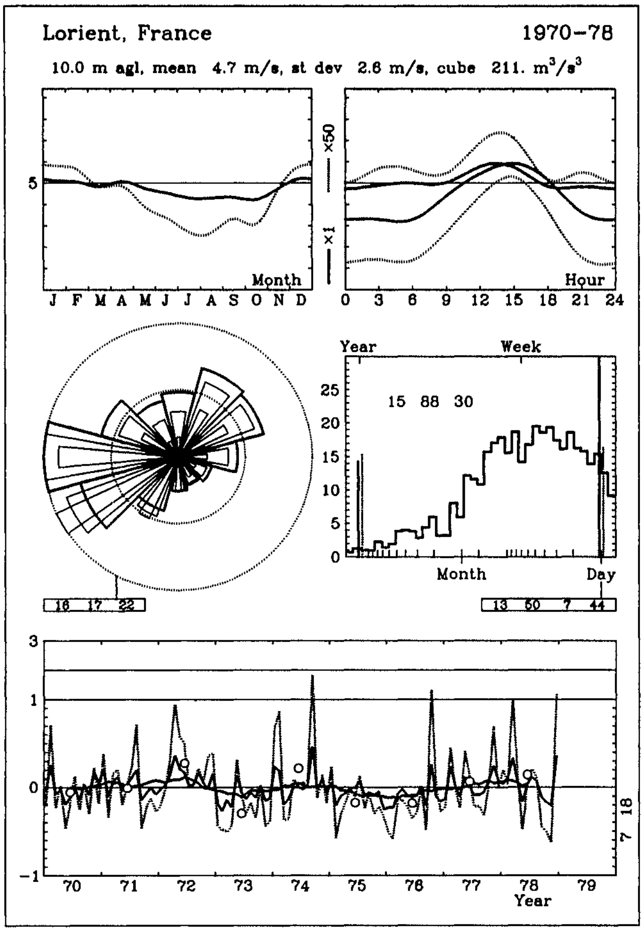
14.0 m agl, mean 2.6 m/s, st dev 2.7 m/s, cube 108. m^3/s^3

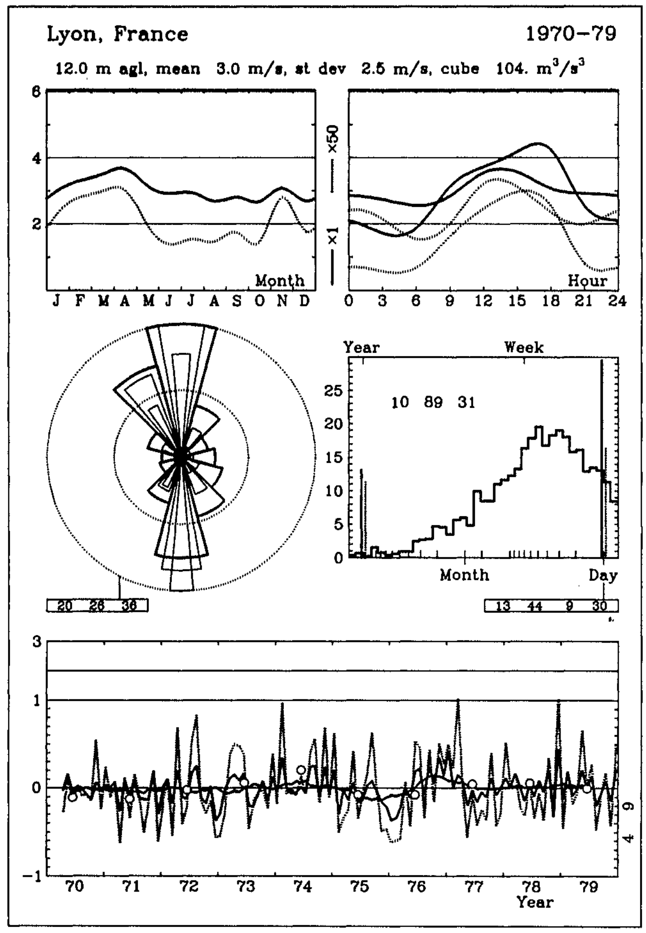


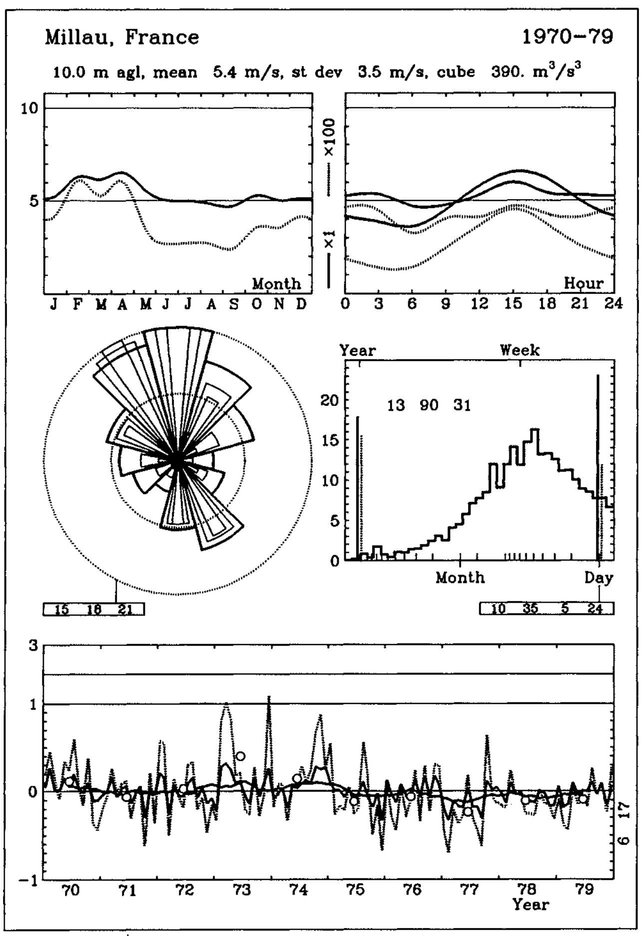
Limoges, France 1970–79

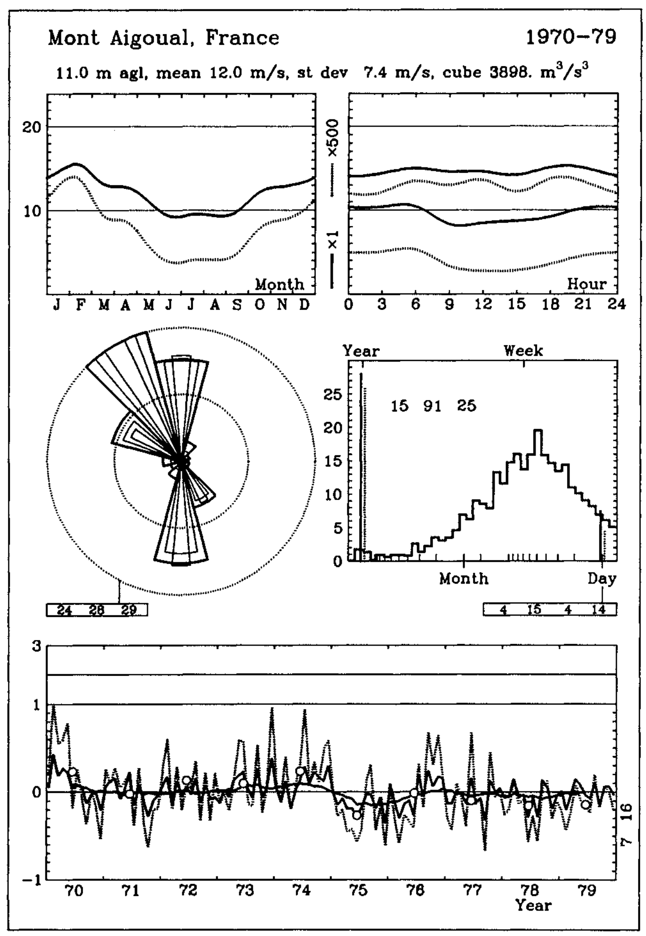
11.0 m agl, mean 2.8 m/s, st dev 2.0 m/s, cube 61. m^3/s^3




Lorient, France
1970–78
10.0 m agl, mean 4.7 m/s, st dev 2.6 m/s, cube 211. m^3/s^3
Month
Hour
×50
×1
Year
Week
15 88 30
Month
Day
16 17 22
13 50 7 44
7 18
Year

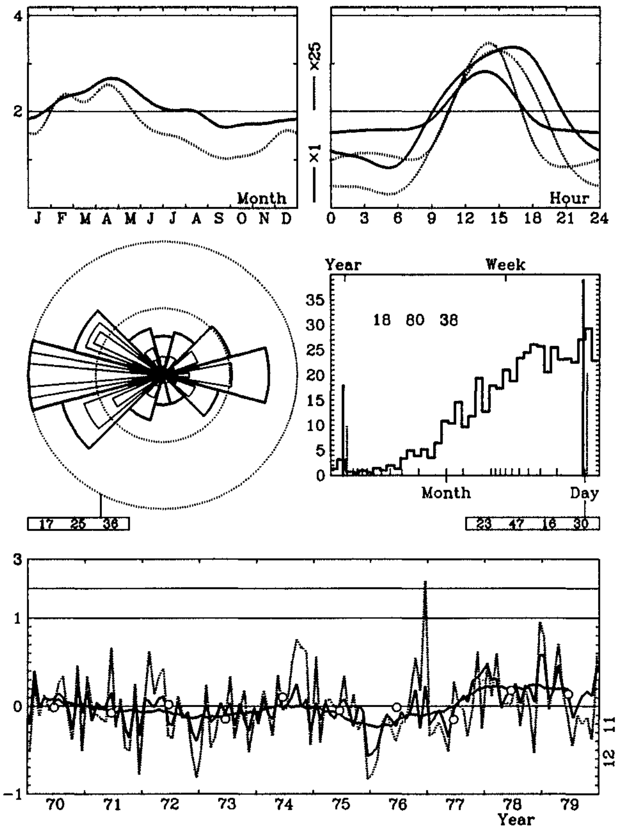

Lyon, France
1970–79
12.0 m agl, mean 3.0 m/s, st dev 2.5 m/s, cube 104. m^3/s^3
Month
Hour
×50
×1
Year
Week
10 89 31
Month
Day
20 26 36
13 44 9 30
4 9
Year


Millau, France
1970–79
10.0 m agl, mean 5.4 m/s, st dev 3.5 m/s, cube 390. m^3/s^3
Month
Hour
×100
×1
Year
Week
13 90 31
Month
Day
15 18 21
10 35 5 24
6 17
Year


Mont Aigoual, France
1970–79
11.0 m agl, mean 12.0 m/s, st dev 7.4 m/s, cube 3898. m^3/s^3
Month
Hour
×500
×1
Year
Week
15 91 25
Month
Day
24 28 29
4 15 4 14
7 16
Year

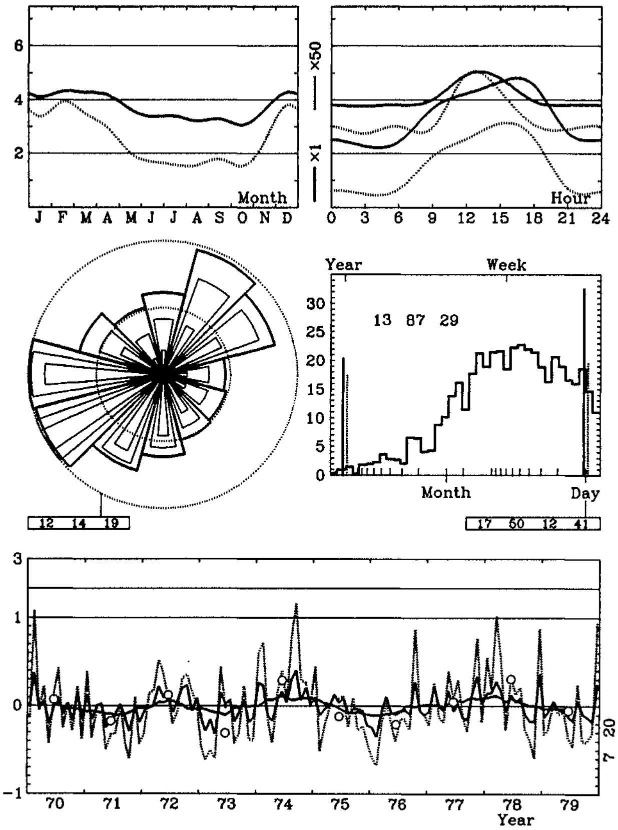
Mont de Marsan, France 1970–79

10.0 m agl, mean 2.1 m/s, st dev 2.0 m/s, cube 42. m^3/s^3



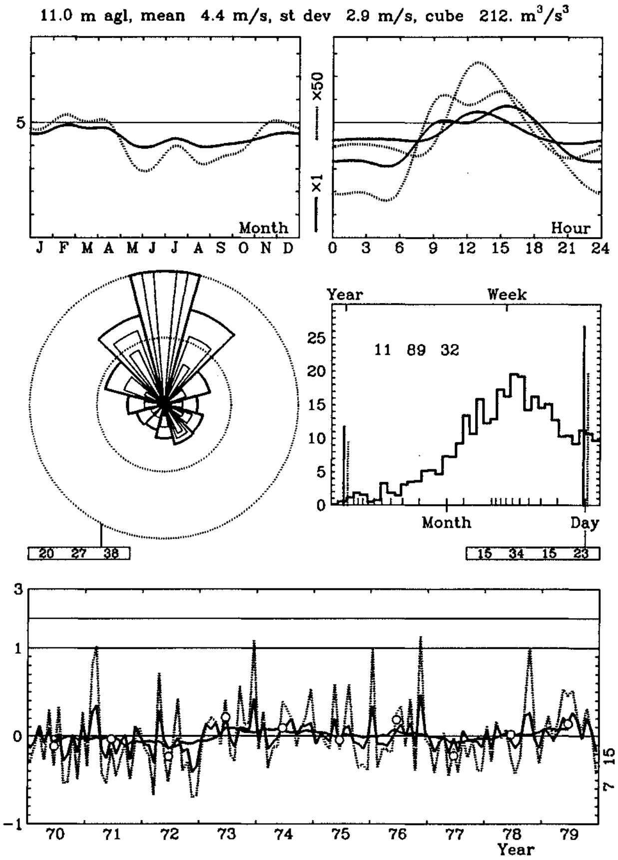
Nantes, France 1970–79

12.0 m agl, mean 3.7 m/s, st dev 2.4 m/s, cube 125. m^3/s^3



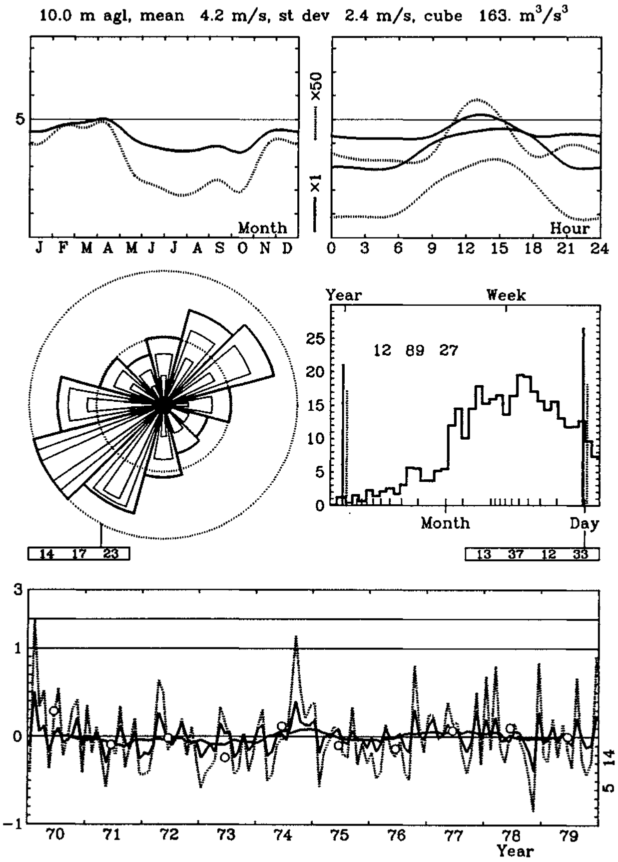
Nîmes, France 1970–79

11.0 m agl, mean 4.4 m/s, st dev 2.9 m/s, cube 212. m^3/s^3



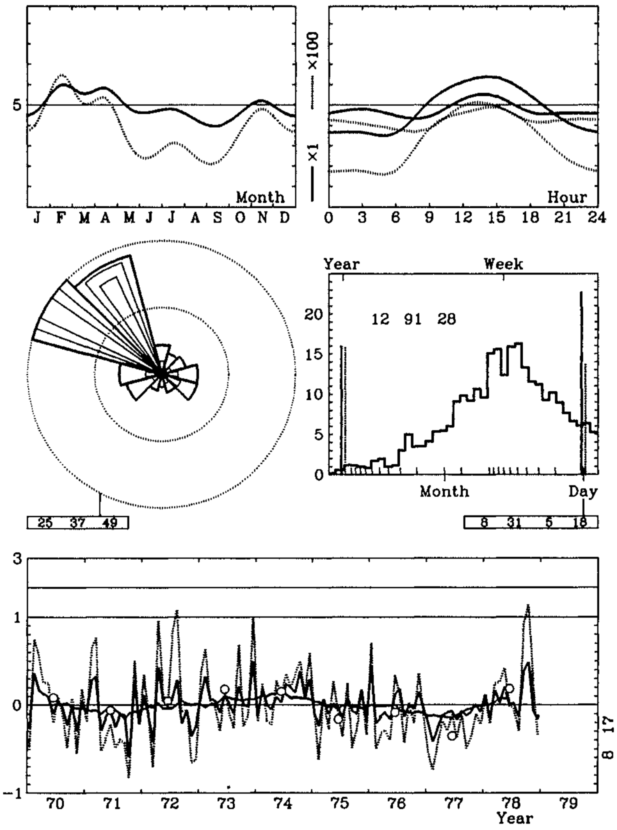
Orléans, France 1970–79

10.0 m agl, mean 4.2 m/s, st dev 2.4 m/s, cube 163. m^3/s^3



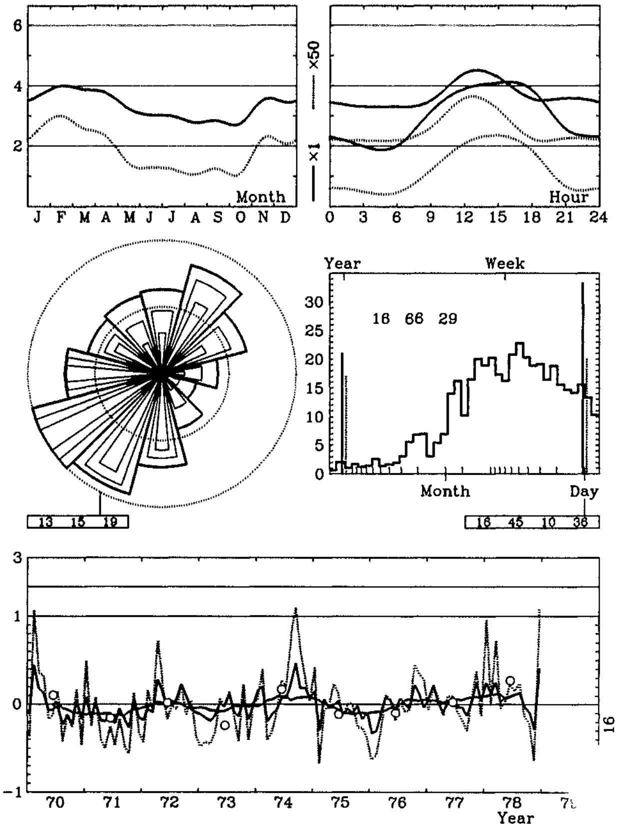
Perpignan, France 1970–78

10.0 m agl, mean 4.9 m/s, st dev 3.8 m/s, cube 389. m^3/s^3



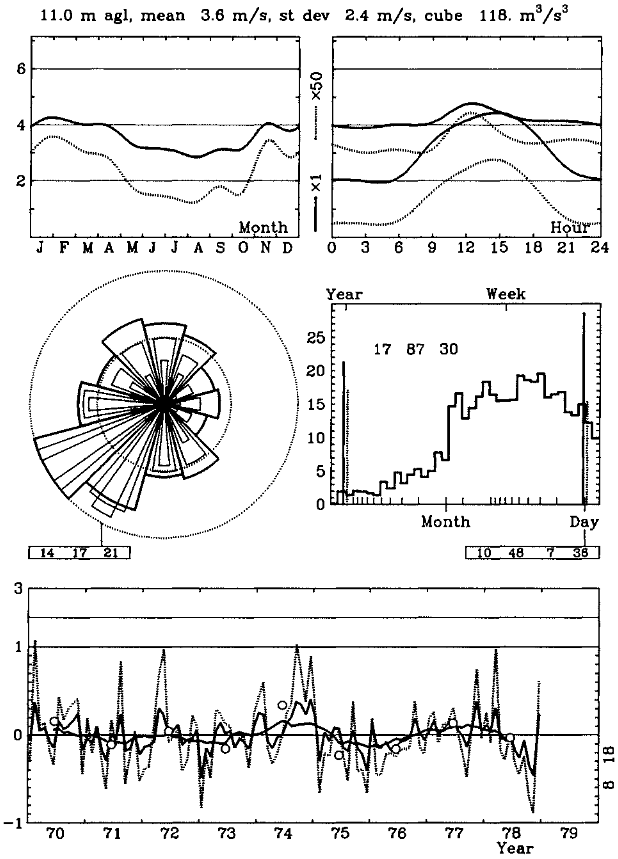
Poitiers, France 1970–78

12.0 m agl, mean 3.3 m/s, st dev 2.2 m/s, cube 92. m^3/s^3



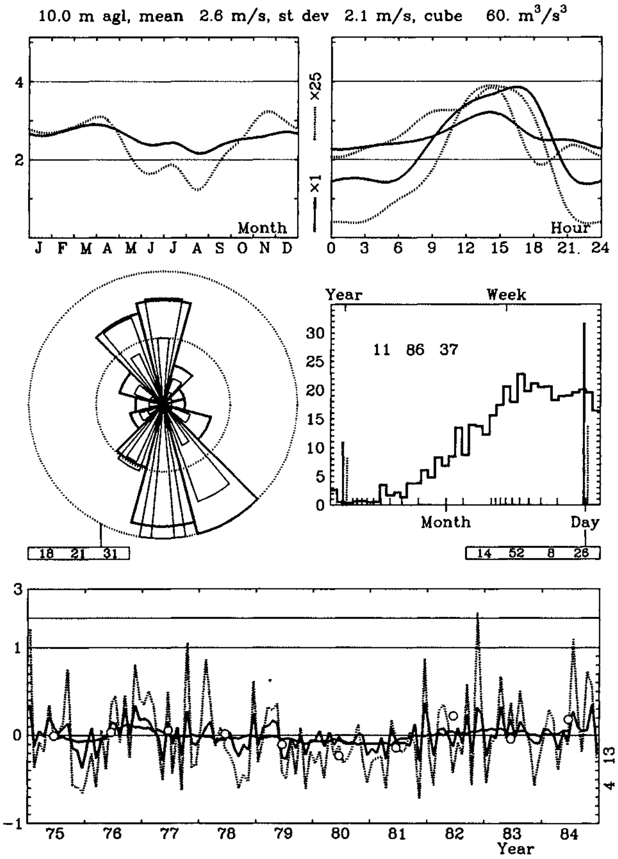
Reims, France 1970–78

11.0 m agl, mean 3.6 m/s, st dev 2.4 m/s, cube 118. m^3/s^3



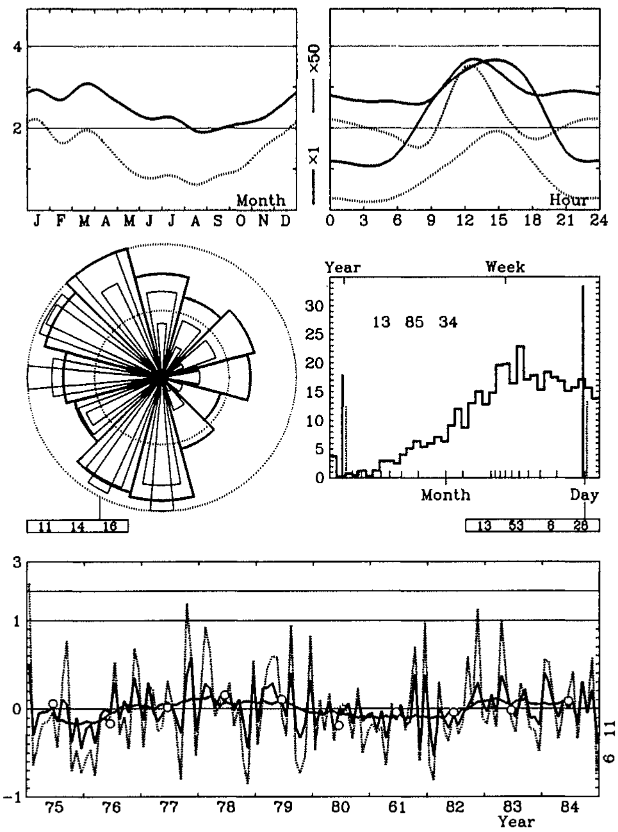
Saint Etienne, France 1975–84

10.0 m agl, mean 2.6 m/s, st dev 2.1 m/s, cube 60. m^3/s^3



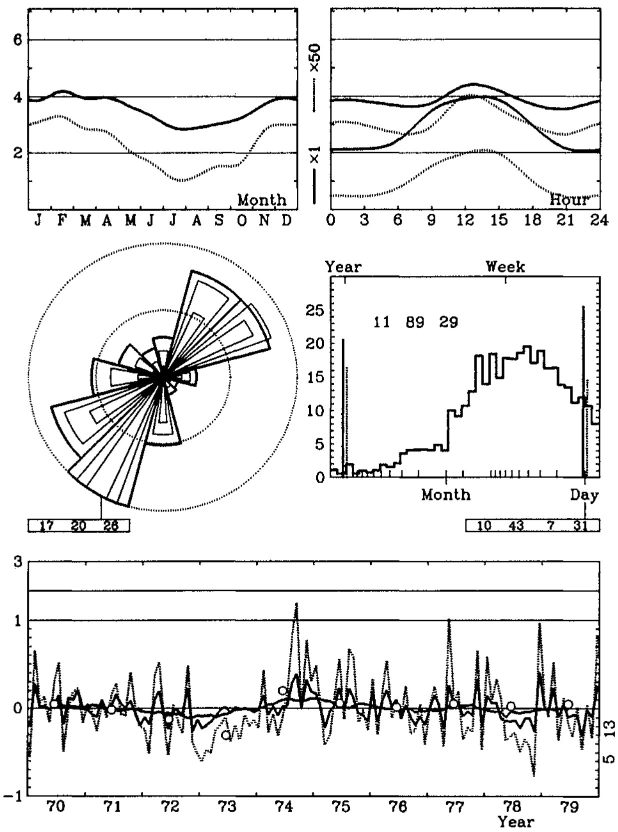
Saint Yan, France 1975–84

10.0 m agl, mean 2.4 m/s, st dev 2.2 m/s, cube 66. m³/s³



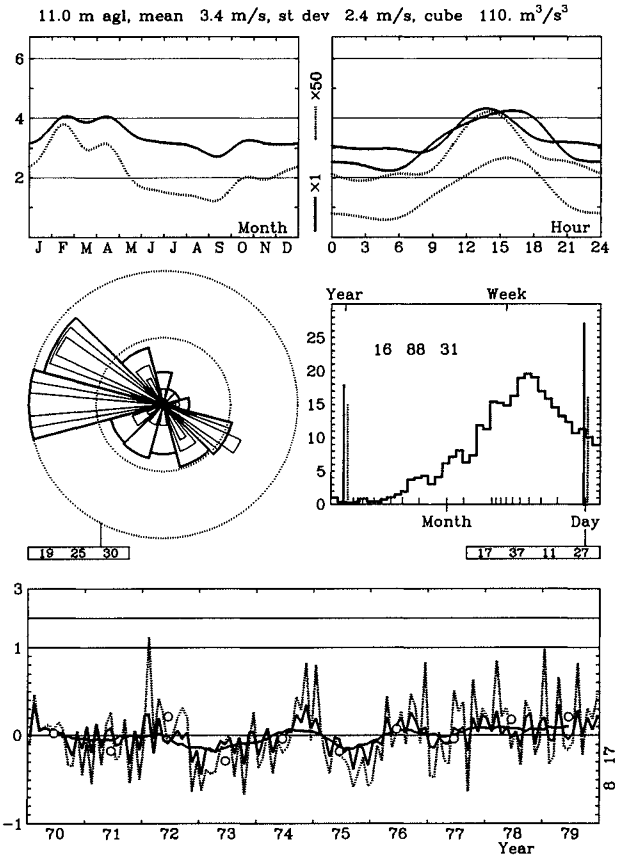
Toul, France 1970–79

12.0 m agl, mean 3.5 m/s, st dev 2.3 m/s, cube 112. m³/s³



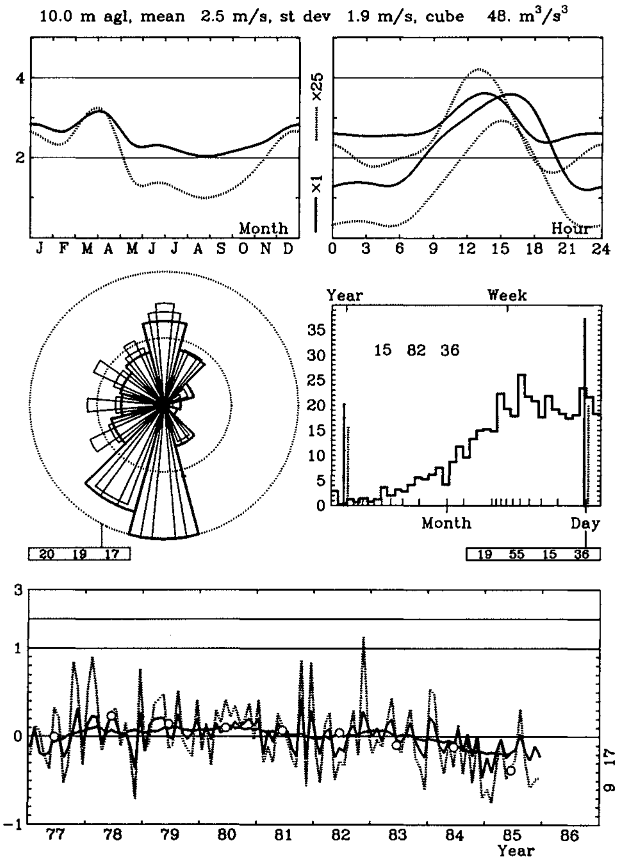
Toulouse, France 1970–79

11.0 m agl, mean 3.4 m/s, st dev 2.4 m/s, cube 110. m³/s³



Vichy, France 1977–85

10.0 m agl, mean 2.5 m/s, st dev 1.9 m/s, cube 48. m³/s³



Berlin

52° 28′ 07″ N 13° 24′ 14″ E	UTM 33 E 391572 m N 5814480 m	48 m a.s.l.

Location at the airport of Berlin, 2.5 km S of the city centre. The anemometer is placed between the runways with no obstacles closer than 450 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.30										
30	0.01	600	0.30										
60	0.01	440	0.30										
90	0.01	400	0.30										
120	0.01	500	0.30										
150	0.01	500	0.30										
180	0.01	800	0.30										
210	0.01	1000	0.30										
240	0.01	1200	0.30										
270	0.01	2000	0.30										
300	0.01	2000	0.30										
330	0.01	1200	0.30										

Height of anemometer: 10.0 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.2	92	130	184	218	179	94	57	27	10	8	0	0	0	0	4.1	2.11
30	5.6	70	115	208	224	178	110	65	24	6	1	0	0	0	0	4.1	2.29
60	5.9	88	113	175	209	180	127	61	33	12	3	1	0	0	0	4.2	2.22
90	9.9	58	120	195	208	182	110	64	39	16	6	1	0	0	0	4.3	2.12
120	8.0	76	117	222	215	160	113	55	29	11	1	0	0	0	0	4.0	2.14
150	6.7	108	167	258	222	141	59	28	12	4	1	0	0	0	0	3.4	2.03
180	7.1	106	202	275	208	111	62	21	9	2	2	0	0	0	0	3.2	1.91
210	8.2	64	85	149	171	161	160	105	61	24	16	3	0	0	0	4.9	2.30
240	10.8	43	77	134	175	155	143	117	75	39	32	7	2	0	0	5.3	2.16
270	15.1	38	54	117	148	151	138	126	91	57	56	16	4	0	0	5.9	2.18
300	10.4	51	49	87	128	157	151	134	93	62	69	14	4	1	0	6.1	2.29
330	7.0	65	89	153	198	197	126	74	50	25	14	7	1	1	0	4.7	2.04
Total	100.0	66	101	170	186	161	121	84	52	27	23	6	1	0	0	4.7	1.91

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.2	3.6	4.1	3.6	3.1	3.0	3.3	2.9	3.0	3.4	4.6	4.8	3.6
3	4.1	3.6	3.9	3.5	2.9	2.6	3.1	2.6	3.0	3.3	4.6	4.8	3.5
6	4.0	3.7	4.2	3.7	3.4	3.2	3.5	3.1	3.0	3.4	4.6	4.8	3.7
9	4.2	3.9	5.0	4.6	4.3	4.2	4.6	3.9	4.1	4.1	5.0	4.9	4.4
12	4.5	4.4	5.6	5.3	4.7	4.8	5.1	4.5	4.7	4.7	5.6	5.3	4.9
15	4.5	4.4	5.5	5.2	4.8	4.8	5.1	4.7	4.5	4.4	5.1	5.1	4.8
18	4.3	4.0	4.7	4.5	4.4	4.2	4.5	3.8	3.5	3.7	4.8	5.0	4.3
21	4.3	3.8	4.3	4.0	3.6	3.2	3.4	3.2	3.1	3.6	4.7	4.9	3.9
Day	4.3	3.9	4.7	4.3	3.9	3.7	4.1	3.6	3.6	3.8	4.9	5.0	4.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.6	6.3	6.6	6.9	6.6	5.8	5.1	6.4	7.8	8.3	8.6	7.8	7.1
	2.43	2.60	2.62	2.54	2.50	2.42	2.31	2.29	2.59	2.57	2.62	2.45	2.33
25	7.3	6.9	7.2	7.6	7.2	6.4	5.6	7.0	8.5	9.1	9.4	8.6	7.8
	2.51	2.69	2.70	2.62	2.58	2.50	2.38	2.36	2.67	2.65	2.71	2.53	2.40
50	7.8	7.4	7.7	8.1	7.7	6.8	6.0	7.5	9.1	9.8	10.1	9.2	8.4
	2.58	2.76	2.77	2.69	2.65	2.56	2.44	2.42	2.74	2.72	2.78	2.60	2.45
100	8.4	8.0	8.4	8.8	8.4	7.4	6.5	8.2	9.9	10.6	10.9	10.0	9.1
	2.49	2.67	2.68	2.60	2.56	2.48	2.37	2.35	2.66	2.63	2.69	2.51	2.38
200	9.4	8.9	9.3	9.8	9.3	8.2	7.2	9.0	10.9	11.7	12.1	11.1	10.1
	2.36	2.53	2.54	2.47	2.43	2.35	2.24	2.22	2.52	2.49	2.55	2.38	2.27
Freq	5.9	5.4	5.8	8.2	8.8	7.2	6.9	7.9	9.8	13.4	12.4	8.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	4.4	4.7	4.8	4.5	3.9	3.5	4.9	5.5	5.9	6.1	5.2	5.0
	2.04	2.20	2.18	2.12	2.08	2.01	1.90	2.10	2.14	2.16	2.24	2.00	1.99
25	5.4	5.3	5.6	5.8	5.4	4.7	4.2	5.9	6.6	7.0	7.3	6.2	6.0
	2.20	2.37	2.35	2.28	2.25	2.18	2.05	2.28	2.31	2.33	2.42	2.16	2.13
50	6.2	6.1	6.5	6.7	6.2	5.4	4.9	6.8	7.6	8.1	8.4	7.1	6.9
	2.47	2.67	2.64	2.57	2.53	2.45	2.30	2.56	2.60	2.62	2.72	2.43	2.37
100	7.4	7.2	7.7	7.9	7.4	6.4	5.8	8.1	9.0	9.6	9.9	8.4	8.2
	2.63	2.84	2.81	2.74	2.69	2.61	2.45	2.72	2.77	2.79	2.90	2.58	2.50
200	9.2	9.0	9.6	9.9	9.2	8.0	7.2	10.0	11.2	12.0	12.4	10.5	10.2
	2.52	2.71	2.69	2.61	2.57	2.49	2.34	2.60	2.64	2.66	2.77	2.47	2.40
Freq	5.5	5.5	5.8	9.2	8.3	6.9	7.1	8.1	10.4	14.5	11.2	7.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	3.9	4.1	4.2	3.9	3.4	3.1	4.4	4.8	5.2	5.3	4.4	4.4
	2.07	2.24	2.20	2.11	2.12	2.00	1.92	2.20	2.14	2.18	2.26	1.99	2.00
25	4.8	4.8	5.1	5.2	4.8	4.2	3.8	5.5	5.9	6.4	6.6	5.4	5.4
	2.22	2.39	2.35	2.26	2.26	2.14	2.05	2.35	2.29	2.33	2.42	2.13	2.13
50	5.7	5.6	6.0	6.1	5.7	4.9	4.4	6.4	6.9	7.4	7.7	6.3	6.3
	2.45	2.65	2.60	2.50	2.51	2.37	2.27	2.60	2.54	2.58	2.68	2.36	2.33
100	6.7	6.7	7.1	7.3	6.7	5.8	5.3	7.6	8.2	8.8	9.2	7.5	7.5
	2.70	2.91	2.86	2.74	2.76	2.60	2.49	2.86	2.79	2.83	2.95	2.59	2.53
200	8.3	8.2	8.8	9.0	8.3	7.1	6.5	9.4	10.2	10.9	11.3	9.3	9.3
	2.58	2.79	2.74	2.63	2.63	2.49	2.39	2.74	2.67	2.71	2.82	2.48	2.44
Freq	5.3	5.6	5.9	9.6	8.2	6.8	7.1	8.2	10.6	14.9	10.7	7.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.1	3.3	3.3	3.0	2.6	2.5	3.6	3.8	4.1	4.2	3.4	3.4
	2.07	2.22	2.15	2.08	2.09	2.03	1.88	2.25	2.15	2.19	2.26	1.99	2.00
25	4.0	4.0	4.3	4.3	4.0	3.4	3.3	4.7	5.0	5.4	5.5	4.4	4.5
	2.19	2.35	2.28	2.20	2.22	2.16	2.00	2.38	2.28	2.32	2.39	2.12	2.11
50	4.8	4.8	5.2	5.3	4.8	4.2	3.9	5.7	6.0	6.5	6.7	5.4	5.5
	2.38	2.56	2.48	2.39	2.41	2.35	2.17	2.59	2.48	2.52	2.60	2.30	2.27
100	5.8	5.8	6.2	6.3	5.8	5.0	4.7	6.8	7.3	7.8	8.0	6.4	6.6
	2.71	2.92	2.83	2.72	2.75	2.67	2.47	2.95	2.83	2.87	2.96	2.62	2.54
200	7.1	7.1	7.6	7.7	7.1	6.1	5.8	8.3	8.9	9.5	9.8	7.9	8.0
	2.62	2.81	2.72	2.63	2.65	2.57	2.38	2.85	2.72	2.77	2.86	2.52	2.46
Freq	5.2	5.6	6.1	9.8	7.9	6.8	7.2	8.4	11.1	14.8	10.2	6.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.3	257	4.4	101	3.9	67	3.0	32
25	6.9	331	5.3	163	4.8	119	4.0	71
50	7.4	403	6.1	231	5.6	178	4.8	117
100	8.1	525	7.3	371	6.7	284	5.8	189
200	8.9	737	9.0	737	8.2	549	7.1	353

Braunschweig

52° 18′ 00″ N	10° 27′ 00″ E	UTM 32	E 598878 m	N 5795517 m	81 m a.s.l.

Location in the southern part of the North German plain, approximately 6 km NW of the city of Braunschweig. The terrain has a closed appearance with forests and villages. The anemometer is situated in an open grass field. To the south, the field is bordered by a forest. The station is part of an agricultural research institute.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.20										
30	0.01	1400	0.20										
60	0.01	1000	0.20										
90	0.01	1000	0.20										
120	0.01	600	0.10	2000	0.30								
150	0.01	400	0.30										
180	0.01	300	0.30									-3	
210	0.01	500	0.30									-3	
240	0.01	400	0.30										
270	0.01	300	0.30	1000	0.15							-3	
300	0.01	1000	0.30	2000	0.10							-9	
330	0.01	1000	0.30	1750	0.20							-2	

Height of anemometer: 10.0 m a.g.l. Period: 73010103-81123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	2.7	195	233	236	145	100	38	28	15	6	2	1	0	0	0	2.9	1.53
30	3.8	118	155	228	197	130	97	40	23	9	4	0	0	0	0	3.7	1.88
60	6.1	81	150	191	222	133	111	58	28	12	9	4	1	0	0	4.0	1.83
90	8.5	73	150	225	198	141	110	59	30	10	3	0	0	0	0	3.9	1.99
120	7.1	69	141	197	182	154	99	78	45	21	14	1	0	0	0	4.3	1.90
150	6.5	75	169	349	258	101	29	15	2	2	0	0	0	0	0	3.2	2.33
180	5.3	122	231	324	166	68	39	30	13	5	2	0	0	0	0	3.0	1.64
210	13.1	43	113	223	221	167	108	67	31	16	11	0	0	0	0	4.2	2.02
240	19.0	28	76	158	193	169	140	108	64	33	23	7	1	0	0	5.1	2.13
270	15.3	38	90	151	172	161	130	107	70	38	34	6	1	1	1	5.2	2.00
300	8.6	60	92	169	186	168	134	81	54	26	22	7	1	0	0	4.8	1.99
330	3.9	120	158	235	223	131	71	31	20	5	4	2	0	0	0	3.6	1.89
Total	100.0	64	125	206	197	147	107	73	42	21	15	3	0	0	0	4.3	1.83

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.0	3.6	3.9	3.4	2.8	2.5	2.6	2.4	3.0	3.3	4.4	4.6	3.4
3	4.0	3.5	3.8	3.2	2.6	2.4	2.6	2.2	3.0	3.2	4.4	4.4	3.3
6	4.2	3.6	3.9	3.2	3.0	2.8	2.9	2.4	2.9	3.3	4.3	4.5	3.4
9	4.2	3.9	4.7	4.4	4.0	3.7	4.2	3.6	3.9	4.0	4.6	4.6	4.2
12	4.6	4.5	5.2	5.2	4.5	4.3	4.5	4.1	4.5	4.6	5.2	5.0	4.7
15	4.4	4.2	5.2	5.1	4.6	4.1	4.5	4.1	4.3	4.1	4.6	4.7	4.5
18	4.1	3.6	4.0	4.1	3.9	3.6	3.6	3.2	2.9	3.3	4.4	4.6	3.8
21	4.1	3.6	3.9	3.4	2.8	2.6	2.5	2.4	3.0	3.5	4.4	4.6	3.4
Day	4.2	3.8	4.3	4.0	3.6	3.3	3.4	3.1	3.5	3.7	4.5	4.6	3.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	5.0	5.8	5.8	6.2	5.6	5.2	6.5	7.8	8.4	8.0	6.6	6.9
	1.98	2.03	2.16	2.30	2.22	2.27	2.19	2.25	2.41	2.40	2.33	2.15	2.10
25	5.3	5.4	6.4	6.4	6.7	6.1	5.6	7.1	8.5	9.2	8.8	7.2	7.5
	2.04	2.10	2.23	2.37	2.29	2.34	2.26	2.32	2.49	2.47	2.41	2.22	2.16
50	5.7	5.8	6.8	6.9	7.2	6.6	6.1	7.7	9.2	9.9	9.4	7.7	8.1
	2.10	2.15	2.29	2.43	2.35	2.40	2.32	2.38	2.56	2.54	2.47	2.28	2.21
100	6.1	6.3	7.4	7.5	7.8	7.1	6.6	8.3	9.9	10.7	10.2	8.4	8.8
	2.03	2.08	2.21	2.35	2.28	2.33	2.25	2.30	2.47	2.46	2.39	2.20	2.15
200	6.8	7.0	8.2	8.3	8.7	7.9	7.3	9.2	11.0	11.8	11.3	9.2	9.7
	1.92	1.97	2.10	2.23	2.16	2.20	2.13	2.18	2.34	2.33	2.27	2.09	2.05
Freq	3.2	3.4	5.2	7.5	7.7	6.7	5.8	10.1	16.8	16.8	11.3	5.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.6	4.1	4.1	4.4	3.7	3.6	4.7	5.6	5.9	5.4	4.1	4.8
	1.56	1.82	1.80	1.94	1.85	2.09	1.73	1.98	2.07	2.01	1.96	1.76	1.81
25	3.8	4.4	4.9	4.9	5.3	4.5	4.3	5.7	6.7	7.1	6.5	4.9	5.7
	1.69	1.97	1.94	2.10	2.00	2.26	1.86	2.14	2.24	2.15	2.12	1.90	1.94
50	4.4	5.1	5.7	5.6	6.2	5.2	5.0	6.6	7.8	8.2	7.5	5.7	6.7
	1.89	2.21	2.19	2.36	2.25	2.54	2.09	2.41	2.52	2.41	2.38	2.14	2.15
100	5.2	6.0	6.8	6.7	7.3	6.1	6.0	7.8	9.2	9.7	8.9	6.8	7.9
	2.01	2.35	2.33	2.51	2.40	2.70	2.23	2.56	2.68	2.57	2.54	2.28	2.27
200	6.5	7.4	8.5	8.3	9.1	7.6	7.4	9.7	11.5	11.9	11.1	8.4	9.8
	1.92	2.24	2.22	2.40	2.29	2.58	2.13	2.45	2.56	2.45	2.42	2.18	2.18
Freq	2.9	3.7	5.8	8.2	7.3	6.5	5.4	12.0	18.2	15.8	9.6	4.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	3.2	3.7	3.6	4.0	3.2	3.1	4.2	5.0	5.2	4.7	3.4	4.2
	1.56	1.85	1.84	1.97	1.88	2.22	1.62	2.01	2.11	2.00	1.96	1.79	1.82
25	3.3	4.0	4.5	4.4	4.9	3.9	3.8	5.1	6.1	6.4	5.8	4.2	5.2
	1.67	1.98	1.97	2.11	2.01	2.37	1.73	2.15	2.26	2.13	2.10	1.92	1.93
50	4.0	4.7	5.3	5.2	5.7	4.6	4.5	6.0	7.2	7.5	6.8	4.9	6.1
	1.85	2.19	2.18	2.33	2.23	2.63	1.92	2.38	2.50	2.34	2.33	2.13	2.11
100	4.7	5.6	6.3	6.1	6.8	5.4	5.4	7.2	8.5	8.9	8.0	5.9	7.2
	2.03	2.41	2.40	2.56	2.45	2.88	2.11	2.62	2.74	2.57	2.56	2.33	2.29
200	5.8	6.9	7.8	7.6	8.4	6.7	6.7	8.8	10.5	10.9	9.9	7.3	8.9
	1.94	2.31	2.29	2.45	2.35	2.76	2.01	2.50	2.63	2.46	2.45	2.24	2.21
Freq	2.8	3.8	6.0	8.4	7.2	6.5	5.3	12.7	18.7	15.5	9.0	4.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.1	2.6	2.9	2.8	3.1	2.5	2.6	3.3	4.0	4.1	3.6	2.6	3.3
	1.53	1.88	1.86	1.99	1.87	2.30	1.73	1.98	2.12	2.00	1.96	1.86	1.83
25	2.8	3.5	3.8	3.7	4.1	3.3	3.5	4.4	5.2	5.4	4.7	3.4	4.4
	1.62	1.99	1.98	2.11	1.98	2.44	1.83	2.10	2.25	2.11	2.08	1.97	1.93
50	3.4	4.2	4.6	4.5	4.9	4.0	4.2	5.3	6.3	6.5	5.7	4.1	5.3
	1.76	2.17	2.15	2.30	2.15	2.65	1.99	2.28	2.44	2.28	2.26	2.14	2.07
100	4.1	5.0	5.5	5.4	5.9	4.8	5.1	6.4	7.5	7.8	6.9	4.9	6.3
	2.00	2.47	2.44	2.62	2.45	3.02	2.26	2.60	2.78	2.59	2.57	2.44	2.31
200	5.0	6.1	6.8	6.6	7.2	5.8	6.2	7.8	9.2	9.4	8.4	6.1	7.7
	1.93	2.38	2.35	2.52	2.37	2.91	2.18	2.50	2.68	2.50	2.48	2.35	2.25
Freq	2.8	4.0	6.3	8.4	7.0	6.4	5.9	13.5	18.7	14.9	8.3	3.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.1	250	4.3	100	3.7	66	2.9	32
25	6.7	320	5.1	159	4.6	117	3.9	70
50	7.2	390	5.9	224	5.4	173	4.7	114
100	7.7	508	7.0	357	6.4	272	5.6	182
200	8.6	717	8.7	706	7.9	524	6.9	339

Bremen

53° 03′ 00″ N	08° 47′ 00″ E	UTM 32	E 485475 m	N 5877978 m	3 m a.s.l.

Location in the northern part of Germany 3.5 km S of the city of Bremen. The landscape is flat with many built-up areas. The anemometer is located on a flat meadow S of the runway with hardly any obstacles within a radius of 500 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.40									-11	
30	0.01	1200	0.30									-6	
60	0.01	1200	0.30										
90	0.01	1200	0.30										
120	0.01	1200	0.30										
150	0.01	1200	0.30										
180	0.01	1000	0.10										
210	0.01	1000	0.10										
240	0.01	1200	0.10										
270	0.01	1500	0.10	3500	0.30								
300	0.01	1500	0.15	4000	0.20								
330	0.01	800	0.10	2000	0.30	4000	0.10					-8	

Height of anemometer: 10.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.4	60	110	156	195	209	143	76	26	13	11	0	1	0	0	4.5	2.38
30	4.9	80	121	214	215	190	103	49	19	6	2	0	0	0	0	4.0	2.28
60	6.6	76	151	197	181	173	97	66	31	19	7	4	0	0	0	4.2	1.93
90	8.4	61	124	169	176	179	137	74	41	22	14	3	0	0	0	4.6	2.12
120	9.7	58	138	178	175	180	129	76	37	21	7	0	0	0	0	4.4	2.20
150	7.2	77	183	230	173	139	98	56	27	10	6	1	0	0	0	3.8	1.82
180	5.5	106	184	203	157	125	96	61	35	19	12	2	0	0	0	3.9	1.67
210	9.0	59	125	154	165	139	132	89	56	42	32	6	1	0	0	4.9	1.91
240	15.0	48	93	120	133	138	138	107	79	64	58	16	5	1	0	5.7	2.04
270	12.7	47	81	105	117	133	143	115	83	70	72	24	6	3	0	6.1	2.07
300	9.9	66	114	155	127	121	121	99	60	54	53	20	7	2	0	5.4	1.77
330	6.7	62	116	164	144	165	132	84	63	34	28	7	1	0	1	4.9	1.95
Total	100.0	63	122	161	156	152	126	85	53	38	32	9	2	1	0	4.9	1.85

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.4	4.0	4.2	3.7	3.3	2.9	2.9	2.7	2.9	3.3	4.8	5.0	3.7
3	4.5	4.1	4.2	3.7	3.1	2.7	2.7	2.5	3.0	3.3	4.8	4.9	3.6
6	4.5	4.0	4.3	3.9	3.4	3.1	3.3	2.6	3.1	3.6	4.8	5.1	3.8
9	4.7	4.4	5.1	5.0	4.4	4.1	4.6	3.9	4.3	4.2	5.2	5.2	4.6
12	5.1	5.0	5.9	5.6	5.0	4.5	5.0	4.6	5.1	4.7	5.9	5.7	5.2
15	4.9	4.7	5.8	5.5	5.0	4.7	5.0	4.5	5.0	4.5	5.3	5.3	5.0
18	4.6	4.1	4.5	4.8	4.3	4.2	4.5	3.6	3.5	3.6	5.0	5.2	4.3
21	4.6	4.1	4.4	4.0	3.5	3.3	3.2	3.0	3.2	3.5	4.8	5.0	3.9
Day	4.7	4.3	4.8	4.5	4.0	3.7	3.9	3.4	3.8	3.8	5.1	5.2	4.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	6.9	6.3	6.6	6.6	6.0	5.6	6.6	7.9	8.5	8.2	7.7	7.3
	2.52	2.62	2.38	2.41	2.56	2.32	2.04	2.18	2.37	2.40	2.22	2.19	2.21
25	8.6	7.6	6.8	7.2	7.2	6.6	6.1	7.3	8.6	9.3	9.0	8.5	7.9
	2.60	2.70	2.46	2.49	2.64	2.40	2.11	2.25	2.44	2.47	2.29	2.26	2.27
50	9.3	8.1	7.3	7.8	7.8	7.1	6.5	7.8	9.3	10.0	9.6	9.1	8.5
	2.67	2.77	2.53	2.55	2.71	2.46	2.16	2.31	2.51	2.53	2.35	2.31	2.32
100	10.0	8.8	8.0	8.4	8.4	7.7	7.1	8.5	10.1	10.8	10.4	9.9	9.2
	2.58	2.68	2.44	2.47	2.63	2.38	2.09	2.23	2.43	2.45	2.28	2.24	2.26
200	11.1	9.7	8.8	9.3	9.3	8.5	7.8	9.4	11.1	12.0	11.5	10.9	10.2
	2.45	2.54	2.31	2.34	2.49	2.26	1.98	2.12	2.30	2.33	2.17	2.12	2.15
Freq	5.3	4.7	5.9	7.7	9.2	8.1	6.2	7.7	12.8	13.6	10.9	7.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.6	4.3	4.7	4.6	4.1	3.9	4.8	5.6	6.1	5.5	5.4	5.1
	2.24	2.19	1.92	2.06	2.15	1.85	1.69	1.88	2.02	2.04	1.81	1.89	1.88
25	6.7	5.5	5.2	5.6	5.5	4.8	4.6	5.7	6.7	7.3	6.6	6.5	6.1
	2.41	2.37	2.08	2.22	2.32	1.99	1.82	2.04	2.18	2.18	1.94	2.05	2.01
50	7.7	6.3	6.0	6.5	6.4	5.6	5.4	6.6	7.8	8.4	7.7	7.5	7.0
	2.71	2.67	2.33	2.49	2.61	2.24	2.05	2.29	2.45	2.42	2.17	2.30	2.24
100	9.1	7.5	7.2	7.7	7.5	6.7	6.4	7.9	9.2	9.8	9.1	8.9	8.3
	2.89	2.84	2.49	2.66	2.78	2.39	2.18	2.44	2.61	2.59	2.32	2.45	2.38
200	11.4	9.3	8.9	9.6	9.4	8.3	7.9	9.8	11.5	12.1	11.2	11.1	10.3
	2.76	2.71	2.37	2.54	2.65	2.28	2.08	2.33	2.49	2.48	2.22	2.34	2.29
Freq	4.7	4.9	6.4	8.2	9.5	7.5	5.7	8.6	14.3	13.0	10.2	7.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	3.9	3.8	4.1	4.0	3.5	3.4	4.2	4.9	5.4	4.7	4.8	4.4
	2.28	2.22	1.90	2.07	2.15	1.81	1.66	1.91	2.02	2.04	1.77	1.93	1.87
25	6.0	4.8	4.7	5.1	4.9	4.3	4.2	5.2	6.1	6.6	5.9	5.9	5.5
	2.44	2.38	2.04	2.22	2.30	1.94	1.77	2.05	2.16	2.16	1.89	2.06	1.99
50	7.1	5.6	5.5	6.0	5.8	5.1	4.9	6.2	7.1	7.7	6.9	6.9	6.4
	2.70	2.64	2.26	2.45	2.55	2.14	1.96	2.27	2.39	2.37	2.08	2.28	2.19
100	8.4	6.7	6.5	7.1	6.9	6.0	5.8	7.3	8.5	9.1	8.2	8.2	7.6
	2.96	2.90	2.48	2.70	2.80	2.35	2.15	2.49	2.63	2.60	2.29	2.51	2.38
200	10.4	8.3	8.1	8.8	8.5	7.4	7.2	9.0	10.5	11.0	10.0	10.1	9.4
	2.84	2.77	2.37	2.58	2.68	2.25	2.06	2.38	2.51	2.49	2.19	2.40	2.30
Freq	4.4	4.9	6.6	8.3	9.6	7.3	5.6	8.9	14.8	12.8	10.0	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.0	3.0	3.3	3.1	2.7	2.8	3.4	3.9	4.2	3.7	3.8	3.5
	2.28	2.18	1.93	2.08	2.13	1.83	1.71	1.91	2.03	2.03	1.78	1.96	1.88
25	5.0	4.0	4.0	4.3	4.1	3.6	3.7	4.5	5.2	5.5	4.9	5.0	4.6
	2.42	2.31	2.04	2.21	2.26	1.94	1.81	2.02	2.15	2.13	1.88	2.08	1.99
50	6.0	4.8	4.8	5.2	5.0	4.4	4.4	5.4	6.2	6.6	5.9	6.0	5.5
	2.63	2.51	2.22	2.40	2.45	2.11	1.97	2.20	2.34	2.29	2.04	2.26	2.14
100	7.2	5.8	5.8	6.2	6.0	5.3	5.3	6.5	7.5	7.9	7.2	7.2	6.7
	2.99	2.87	2.53	2.74	2.79	2.40	2.24	2.50	2.66	2.60	2.32	2.57	2.41
200	8.8	7.1	7.1	7.6	7.3	6.4	6.5	8.0	9.2	9.6	8.7	8.8	8.1
	2.88	2.76	2.44	2.63	2.69	2.31	2.16	2.41	2.57	2.51	2.24	2.48	2.34
Freq	4.5	5.1	6.8	8.5	9.5	7.1	5.8	9.6	14.7	12.4	9.5	6.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	283	4.5	113	3.9	75	3.1	36
25	7.0	362	5.4	179	4.8	132	4.1	78
50	7.6	440	6.2	251	5.7	195	4.9	128
100	8.2	572	7.4	399	6.7	306	5.9	204
200	9.0	806	9.1	787	8.3	587	7.2	379

Düsseldorf

51° 17′ 00″ N 06° 47′ 00″ E	UTM 32 E 345407 m N 5683784 m	37 m a.s.l.

Location at the airport Düsseldorf-Lohausen, which is situated in the lower part of the Rhine valley, 7 km NE of the centre of Düsseldorf. The area is essentially flat to a distance of more than 10 km. The terrain outside the airport area is characterized by villages and forests. To the south the suburbs of Düsseldorf approach the airport area.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.03										
30	0.01	800	0.30										
60	0.01	1100	0.30										
90	0.01	1000	0.30										
120	0.01	800	0.30									-1	
150	0.01	1500	0.30									-6	
180	0.01	1100	0.30									-2	
210	0.01	2500	0.30										
240	0.01	2500	0.30										
270	0.01	1500	0.15										
300	0.01	1000	0.30	3000	0.15								
330	0.01	2000	0.20										

Height of anemometer: 10.2 m a.g.l. Period: 70010103–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	7.3	148	229	236	165	122	52	28	14	5	0	1	0	0	0	3.1	1.70
30	8.3	116	160	212	185	140	90	52	31	9	3	0	0	0	0	3.7	1.88
60	5.8	152	160	198	181	127	82	47	29	14	9	1	0	0	0	3.7	1.70
90	3.7	194	260	310	131	58	31	11	4	1	1	0	0	0	0	2.6	1.77
120	5.0	125	219	221	175	130	69	39	12	6	3	1	0	0	0	3.3	1.73
150	16.5	24	62	124	184	184	157	117	74	41	29	4	0	0	0	5.3	2.34
180	8.4	51	80	161	202	179	126	95	52	30	21	3	0	0	0	4.8	2.10
210	12.8	45	69	127	154	161	137	116	80	51	46	10	3	0	0	5.5	2.12
240	13.3	53	95	134	142	146	141	106	75	40	49	15	4	0	1	5.5	1.97
270	8.2	75	113	160	169	145	120	90	53	30	30	8	3	2	1	4.8	1.76
300	6.3	104	112	204	201	165	89	67	30	19	8	2	0	1	0	4.1	1.87
330	4.3	154	184	202	171	111	75	56	29	11	7	1	0	0	0	3.5	1.63
Total	100.0	83	122	172	171	149	112	82	50	28	23	5	1	0	0	4.5	1.81

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.0	3.9	3.4	2.8	2.4	2.5	2.4	2.8	3.4	4.7	4.5	3.5
3	4.8	4.1	3.8	3.2	2.9	2.4	2.5	2.3	2.9	3.3	4.6	4.5	3.4
6	4.7	4.1	3.8	3.4	3.0	2.7	2.9	2.5	3.1	3.5	4.6	4.7	3.6
9	4.9	4.3	4.6	4.5	4.0	3.7	3.9	3.5	3.9	4.0	5.0	4.8	4.3
12	5.3	5.0	5.1	5.2	4.5	4.4	4.6	4.2	4.5	4.6	5.5	5.3	4.8
15	4.9	4.8	5.3	5.4	4.5	4.5	4.5	4.3	4.5	4.3	5.2	4.9	4.8
18	4.6	4.2	4.2	4.5	3.9	3.7	3.9	3.5	3.2	3.2	4.8	4.7	4.0
21	4.7	4.1	3.8	3.6	2.9	2.7	2.8	2.5	3.0	3.4	4.8	4.7	3.6
Day	4.8	4.3	4.3	4.1	3.6	3.3	3.4	3.1	3.5	3.7	4.9	4.8	4.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	5.2	5.6	4.5	4.7	8.0	7.8	7.8	7.9	7.3	6.3	5.5	6.7
	1.98	2.06	2.08	1.83	1.90	2.61	2.61	2.49	2.39	2.18	2.10	2.06	2.09
25	5.0	5.7	6.1	5.0	5.1	8.7	8.5	8.5	8.6	8.0	7.0	6.0	7.4
	2.04	2.13	2.15	1.88	1.97	2.69	2.69	2.57	2.47	2.25	2.17	2.13	2.15
50	5.3	6.1	6.5	5.3	5.5	9.4	9.1	9.1	9.2	8.5	7.5	6.5	7.9
	2.10	2.19	2.21	1.93	2.02	2.76	2.77	2.64	2.53	2.31	2.23	2.18	2.19
100	5.8	6.6	7.1	5.8	5.9	10.1	9.9	9.9	10.0	9.3	8.1	7.0	8.6
	2.03	2.12	2.14	1.87	1.95	2.68	2.68	2.56	2.45	2.23	2.16	2.12	2.13
200	6.4	7.3	7.8	6.4	6.6	11.2	11.0	10.9	11.1	10.2	8.9	7.8	9.5
	1.92	2.01	2.03	1.77	1.85	2.53	2.54	2.42	2.32	2.12	2.05	2.00	2.04
Freq	6.1	7.9	6.8	4.5	4.5	12.3	11.4	11.2	13.1	10.1	7.0	5.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.9	3.8	2.9	3.5	5.8	5.2	5.5	5.4	4.9	4.3	3.6	4.7
	1.69	1.81	1.70	1.59	1.66	2.29	2.11	2.10	1.97	1.78	1.81	1.67	1.80
25	3.7	4.7	4.6	3.5	4.2	6.9	6.3	6.6	6.5	5.9	5.1	4.3	5.6
	1.82	1.95	1.83	1.71	1.79	2.47	2.28	2.27	2.13	1.92	1.95	1.79	1.92
50	4.3	5.4	5.4	4.0	4.8	8.0	7.2	7.6	7.5	6.8	6.0	5.1	6.5
	2.04	2.19	2.06	1.93	2.01	2.78	2.56	2.55	2.40	2.16	2.19	2.02	2.13
100	5.1	6.4	6.4	4.8	5.8	9.4	8.6	9.0	8.9	8.1	7.1	6.0	7.7
	2.17	2.33	2.19	2.05	2.14	2.96	2.73	2.72	2.55	2.30	2.33	2.15	2.24
200	6.3	8.0	7.9	6.0	7.2	11.7	10.7	11.2	11.1	10.0	8.8	7.5	9.6
	2.08	2.23	2.10	1.96	2.05	2.83	2.61	2.60	2.44	2.19	2.23	2.05	2.15
Freq	6.9	8.1	6.2	4.0	4.8	15.1	9.5	12.3	13.2	8.8	6.5	4.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	3.5	3.3	2.5	3.1	5.1	4.5	4.8	4.7	4.2	3.7	3.1	4.1
	1.73	1.83	1.68	1.69	1.71	2.31	2.08	2.12	1.95	1.77	1.85	1.64	1.81
25	3.3	4.3	4.2	3.0	3.9	6.3	5.5	5.9	5.8	5.2	4.6	3.8	5.1
	1.85	1.96	1.80	1.81	1.83	2.47	2.22	2.27	2.09	1.89	1.98	1.76	1.92
50	3.9	5.0	4.9	3.6	4.5	7.3	6.5	7.0	6.9	6.1	5.4	4.5	5.9
	2.04	2.16	1.99	2.00	2.03	2.74	2.46	2.51	2.31	2.09	2.19	1.94	2.09
100	4.7	6.0	5.8	4.3	5.4	8.7	7.7	8.3	8.2	7.3	6.4	5.4	7.1
	2.24	2.38	2.19	2.19	2.22	3.01	2.70	2.76	2.54	2.30	2.41	2.13	2.26
200	5.8	7.4	7.2	5.3	6.7	10.8	9.5	10.2	10.1	9.0	7.9	6.7	8.7
	2.15	2.28	2.09	2.10	2.13	2.88	2.59	2.64	2.43	2.20	2.31	2.05	2.18
Freq	7.2	8.2	5.9	3.8	4.9	16.1	8.7	12.7	13.3	8.4	6.3	4.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.1	2.8	2.6	1.9	2.8	4.0	3.5	3.8	3.7	3.3	2.9	2.3	3.2
	1.65	1.86	1.67	1.63	1.77	2.34	2.09	2.12	1.94	1.75	1.85	1.60	1.81
25	2.8	3.6	3.4	2.5	3.8	5.3	4.7	5.0	4.9	4.3	3.8	3.1	4.3
	1.75	1.98	1.77	1.73	1.88	2.48	2.22	2.24	2.05	1.85	1.96	1.70	1.90
50	3.4	4.4	4.2	3.1	4.6	6.3	5.6	6.0	5.9	5.2	4.6	3.8	5.1
	1.90	2.14	1.92	1.88	2.04	2.69	2.41	2.44	2.23	2.01	2.13	1.84	2.04
100	4.1	5.3	5.0	3.7	5.5	7.6	6.7	7.3	7.1	6.3	5.6	4.6	6.2
	2.17	2.44	2.19	2.14	2.32	3.07	2.74	2.78	2.55	2.30	2.42	2.10	2.28
200	5.1	6.5	6.1	4.6	6.7	9.3	8.2	8.9	8.7	7.7	6.8	5.6	7.6
	2.09	2.35	2.11	2.06	2.24	2.96	2.64	2.67	2.45	2.21	2.33	2.02	2.21
Freq	7.3	8.1	5.6	3.8	6.0	15.8	8.9	12.9	12.8	8.0	6.1	4.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.9	236	4.2	94	3.6	62	2.9	30
25	6.5	302	5.0	150	4.5	110	3.8	66
50	7.0	367	5.8	210	5.3	163	4.6	108
100	7.6	479	6.8	337	6.3	259	5.5	172
200	8.4	676	8.5	670	7.7	502	6.7	322

Frankfurt

50° 02′ 00″ N 08° 36′ 00″ E	UTM 32 E 471351 m N 5542525 m	111 m a.s.l.

Location at the airport of Frankfurt, 8 km SW of the city centre. The area around the airport is forested. The anemometer is placed at the eastern edge of the runway area with the forest 200 m to the E.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.40										
30	0.01	300	0.10	1000	0.40								
60	0.01	150	0.40										
90	0.01	150	0.40										
120	0.01	150	0.40										
150	0.01	200	0.40										
180	0.01	500	0.40										
210	0.01	1400	0.40										
240	0.01	6000	0.40										
270	0.01	1400	0.40										
300	0.01	800	0.40										
330	0.01	600	0.40										

Height of anemometer: 10.0 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.2	178	170	206	146	133	78	49	26	9	6	0	0	0	0	3.4	1.62
30	15.4	99	160	208	171	141	101	65	29	16	8	0	0	0	0	3.9	1.85
60	13.6	159	299	271	124	70	37	22	10	6	3	0	0	0	0	2.7	1.49
90	6.5	292	292	210	107	59	21	13	6	0	0	0	0	0	0	2.2	1.41
120	3.6	372	280	180	106	31	23	7	0	0	0	0	0	0	0	1.9	1.38
150	2.3	455	305	170	50	15	5	0	0	0	0	0	0	0	0	1.5	1.44
180	7.7	205	225	210	180	90	51	23	12	4	1	0	0	0	0	2.9	1.66
210	19.8	68	114	188	193	172	112	77	42	18	14	2	0	0	0	4.4	2.00
240	13.0	71	107	142	160	131	108	101	71	49	45	11	3	0	0	5.1	1.84
270	5.8	95	86	148	161	139	120	92	70	40	34	10	3	2	0	5.0	1.82
300	4.3	126	58	166	231	175	122	71	29	12	8	2	0	0	0	4.3	2.16
330	3.9	141	106	173	216	179	93	53	30	4	4	1	0	0	0	4.0	2.16
Total	100.0	142	174	196	162	123	82	57	32	17	13	3	1	0	0	3.7	1.60

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.1	2.9	3.0	2.9	2.4	2.3	2.2	2.0	2.2	2.4	3.3	3.5	2.7
3	3.1	2.8	3.0	2.8	2.6	2.3	2.2	1.9	2.1	2.3	3.2	3.5	2.7
6	3.1	2.7	3.0	3.0	2.8	2.8	2.6	2.1	2.2	2.5	3.3	3.5	2.8
9	3.3	3.2	4.1	4.2	3.7	3.8	3.6	3.3	3.3	3.1	3.7	3.7	3.6
12	3.9	3.9	4.6	4.8	4.3	4.3	4.2	3.9	4.0	3.6	4.3	4.3	4.2
15	3.6	3.9	4.7	4.9	4.5	4.3	4.5	4.1	4.1	3.4	4.1	4.1	4.2
18	3.2	2.9	3.6	4.0	3.8	3.7	3.8	3.4	2.9	2.5	3.4	3.5	3.4
21	3.2	2.9	3.3	3.1	3.0	2.7	2.7	2.4	2.5	2.5	3.4	3.5	2.9
Day	3.3	3.1	3.6	3.7	3.4	3.3	3.2	2.9	2.9	2.8	3.6	3.7	3.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	6.6	5.9	5.0	4.1	3.3	4.5	6.3	6.8	7.1	7.0	6.5	6.0
	2.19	2.18	1.88	1.73	1.65	1.57	1.85	2.25	2.22	2.12	2.26	2.55	1.96
25	6.5	7.2	6.4	5.4	4.5	3.7	4.9	6.8	7.4	7.8	7.7	7.1	6.6
	2.26	2.24	1.94	1.78	1.71	1.62	1.91	2.32	2.30	2.18	2.33	2.63	2.02
50	7.0	7.7	6.9	5.9	4.9	4.0	5.3	7.3	7.9	8.4	8.3	7.6	7.1
	2.32	2.31	1.99	1.83	1.75	1.67	1.96	2.38	2.36	2.24	2.40	2.70	2.07
100	7.6	8.4	7.5	6.3	5.3	4.3	5.7	8.0	8.6	9.1	9.0	8.2	7.7
	2.25	2.23	1.93	1.77	1.70	1.61	1.90	2.30	2.28	2.17	2.32	2.62	2.01
200	8.4	9.2	8.3	7.0	5.8	4.7	6.3	8.8	9.5	10.0	9.9	9.1	8.5
	2.13	2.11	1.83	1.67	1.61	1.53	1.79	2.18	2.16	2.05	2.20	2.48	1.91
Freq	4.0	10.3	14.0	9.8	5.0	2.9	5.2	14.7	16.1	8.9	4.9	4.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.6	3.9	3.3	2.8	2.2	3.2	4.5	4.8	5.1	4.8	4.5	4.2
	1.73	1.82	1.51	1.44	1.39	1.34	1.60	1.93	1.84	1.78	1.99	2.10	1.67
25	4.8	5.5	4.7	3.9	3.4	2.6	3.9	5.4	5.8	6.1	5.7	5.3	5.0
	1.87	1.97	1.63	1.55	1.50	1.44	1.73	2.09	1.98	1.93	2.15	2.27	1.79
50	5.6	6.3	5.4	4.6	3.9	3.0	4.5	6.3	6.7	7.1	6.6	6.2	5.8
	2.10	2.21	1.83	1.74	1.68	1.62	1.94	2.35	2.23	2.17	2.42	2.55	1.99
100	6.7	7.5	6.5	5.5	4.7	3.6	5.4	7.4	7.9	8.4	7.8	7.3	6.9
	2.24	2.35	1.95	1.85	1.79	1.72	2.06	2.50	2.37	2.31	2.58	2.71	2.11
200	8.3	9.4	8.0	6.8	5.8	4.5	6.7	9.2	9.9	10.4	9.8	9.1	8.6
	2.13	2.25	1.86	1.77	1.71	1.64	1.98	2.38	2.27	2.20	2.46	2.59	2.02
Freq	4.1	13.2	13.6	8.0	4.3	2.6	6.7	17.7	14.4	7.0	4.5	4.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	4.0	3.3	2.8	2.4	1.8	2.9	4.0	4.2	4.5	4.2	3.9	3.7
	1.66	1.83	1.49	1.46	1.38	1.36	1.63	1.98	1.84	1.79	2.07	2.12	1.68
25	4.3	4.9	4.1	3.5	3.0	2.3	3.5	4.9	5.3	5.6	5.1	4.8	4.5
	1.77	1.96	1.59	1.56	1.48	1.46	1.74	2.12	1.98	1.92	2.22	2.28	1.79
50	5.0	5.8	4.8	4.1	3.5	2.7	4.2	5.8	6.2	6.6	6.0	5.6	5.3
	1.96	2.17	1.76	1.72	1.63	1.61	1.93	2.34	2.18	2.13	2.45	2.52	1.96
100	6.0	6.9	5.8	5.0	4.2	3.3	5.0	6.9	7.3	7.8	7.1	6.7	6.4
	2.15	2.38	1.93	1.89	1.79	1.76	2.12	2.57	2.40	2.34	2.70	2.77	2.13
200	7.4	8.5	7.1	6.1	5.2	4.0	6.2	8.5	9.1	9.6	8.8	8.2	7.8
	2.06	2.28	1.85	1.81	1.71	1.69	2.03	2.46	2.30	2.24	2.58	2.65	2.05
Freq	4.2	14.2	13.5	7.3	4.0	2.5	7.2	18.8	13.7	6.3	4.4	3.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.2	2.6	2.1	1.8	1.5	2.4	3.2	3.4	3.6	3.2	3.0	2.9
	1.69	1.84	1.49	1.41	1.38	1.40	1.66	1.99	1.83	1.81	2.10	2.07	1.69
25	3.6	4.2	3.4	2.8	2.4	2.0	3.1	4.2	4.4	4.7	4.2	4.0	3.8
	1.79	1.95	1.58	1.49	1.46	1.48	1.76	2.11	1.94	1.92	2.23	2.19	1.78
50	4.4	5.0	4.1	3.4	3.0	2.4	3.8	5.1	5.4	5.7	5.1	4.8	4.6
	1.94	2.12	1.71	1.62	1.58	1.60	1.91	2.29	2.11	2.08	2.42	2.38	1.92
100	5.3	6.1	5.0	4.1	3.6	2.9	4.6	6.1	6.5	6.9	6.1	5.7	5.6
	2.21	2.41	1.95	1.84	1.80	1.82	2.17	2.61	2.40	2.38	2.76	2.71	2.15
200	6.5	7.4	6.1	5.0	4.4	3.6	5.6	7.4	7.9	8.4	7.5	7.0	6.8
	2.13	2.32	1.88	1.77	1.73	1.76	2.10	2.51	2.31	2.29	2.66	2.62	2.08
Freq	4.6	15.1	13.5	6.4	3.6	2.5	8.3	19.6	12.5	5.7	4.3	3.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.3	180	3.7	74	3.3	49	2.6	24
25	5.8	230	4.5	117	4.0	86	3.4	51
50	6.3	279	5.2	162	4.7	126	4.1	83
100	6.8	365	6.1	258	5.6	197	4.9	131
200	7.5	519	7.6	516	7.0	383	6.0	247

Hamburg

53° 38′ 00″ N	09° 59′ 00″ E	UTM 32	E 565024 m	N 5943303 m	13 m a.s.l.

Location at the airport Hamburg-Fuhlsbüttel which is situated on a flat meadow within a typical suburban area in the plains of N Germany. The anemometer is placed between the runways.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1100	0.40										
30	0.01	1500	0.40										
60	0.01	900	0.40										
90	0.01	700	0.40										
120	0.01	1000	0.40										
150	0.01	800	0.40										
180	0.01	600	0.40										
210	0.01	700	0.40										
240	0.01	1250	0.15	2500	0.40								
270	0.01	1100	0.40										
300	0.01	1500	0.40										
330	0.01	750	0.15	3500	0.40								

Height of anemometer: 10.0 m a.g.l. Period: 70010103–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	2.8	215	212	170	137	107	83	34	29	6	6	1	0	0	0	3.2	1.49
30	5.4	112	176	193	158	141	116	51	28	20	6	1	0	0	0	3.9	1.82
60	7.5	73	114	154	173	167	136	89	42	31	19	2	0	0	0	4.7	2.09
90	8.0	69	130	187	176	181	122	83	30	13	7	1	0	0	0	4.3	2.17
120	8.2	57	110	184	162	179	137	84	49	24	13	1	0	0	0	4.6	2.21
150	8.8	57	109	235	212	168	119	53	26	15	6	1	0	0	0	4.1	2.08
180	3.7	104	131	208	177	151	109	75	28	12	6	0	0	0	0	4.0	1.98
210	10.5	45	61	125	142	158	176	134	69	50	33	6	1	0	0	5.6	2.48
240	15.1	35	68	111	132	152	163	119	94	60	49	14	2	0	0	5.9	2.33
270	13.3	49	86	143	141	156	140	95	70	46	53	15	4	1	2	5.5	1.87
300	10.9	67	123	140	137	142	123	104	64	48	39	12	0	2	0	5.2	1.91
330	5.7	158	207	198	155	120	84	38	16	11	11	2	1	0	0	3.4	1.53
Total	100.0	69	111	161	155	155	134	90	54	35	27	7	1	0	0	4.9	1.95

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.4	3.8	4.1	3.4	3.0	2.6	2.6	2.3	3.0	3.3	4.8	4.9	3.5
3	4.3	3.9	4.0	3.4	2.7	2.5	2.6	2.2	3.0	3.3	4.8	4.9	3.5
6	4.5	3.9	4.1	3.7	3.4	3.1	3.2	2.5	3.1	3.4	4.7	4.8	3.7
9	4.7	4.3	5.1	5.0	4.5	4.0	4.4	3.9	4.3	4.2	5.1	5.1	4.5
12	5.1	4.8	5.8	5.6	5.2	4.8	5.1	4.5	4.9	4.9	5.7	5.6	5.2
15	4.8	4.8	5.9	5.6	5.2	5.0	4.9	4.6	4.9	4.6	5.3	5.2	5.1
18	4.7	4.2	4.6	5.1	4.8	4.6	4.6	3.8	3.6	3.7	5.0	5.1	4.5
21	4.6	4.0	4.2	3.7	3.4	3.0	3.0	2.6	3.2	3.5	5.0	4.9	3.8
Day	4.6	4.2	4.7	4.4	4.0	3.7	3.8	3.3	3.7	3.9	5.0	5.0	4.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	5.6	6.8	6.9	6.9	6.7	6.3	8.3	8.8	8.5	8.0	6.6	7.4
	1.76	2.05	2.32	2.51	2.56	2.49	2.38	2.74	2.81	2.38	2.24	1.99	2.26
25	5.4	6.1	7.4	7.6	7.6	7.3	6.9	9.1	9.6	9.3	8.8	7.2	8.1
	1.82	2.11	2.40	2.59	2.64	2.57	2.46	2.83	2.90	2.45	2.31	2.05	2.32
50	5.9	6.6	7.9	8.1	8.1	7.8	7.4	9.8	10.3	10.0	9.4	7.8	8.7
	1.87	2.17	2.46	2.66	2.71	2.64	2.53	2.90	2.98	2.52	2.37	2.10	2.37
100	6.3	7.2	8.6	8.8	8.8	8.5	8.0	10.6	11.2	10.8	10.2	8.4	9.4
	1.81	2.10	2.38	2.58	2.63	2.55	2.45	2.81	2.88	2.45	2.30	2.04	2.31
200	7.0	7.9	9.5	9.8	9.8	9.4	8.9	11.8	12.4	12.0	11.3	9.3	10.4
	1.71	1.99	2.26	2.44	2.49	2.42	2.31	2.66	2.73	2.32	2.17	1.93	2.20
Freq	4.2	4.3	6.6	7.8	8.2	8.5	6.0	7.6	13.2	14.0	11.9	7.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	4.0	4.9	4.8	4.9	4.6	4.4	6.0	6.1	5.9	5.5	4.1	5.2
	1.48	1.77	2.01	2.12	2.14	2.04	1.97	2.38	2.30	1.91	1.88	1.57	1.92
25	4.1	4.8	5.9	5.7	5.9	5.4	5.3	7.2	7.3	7.0	6.5	4.9	6.2
	1.59	1.91	2.17	2.28	2.31	2.20	2.13	2.57	2.49	2.05	2.03	1.69	2.05
50	4.8	5.6	6.8	6.6	6.8	6.3	6.1	8.3	8.4	8.1	7.6	5.7	7.2
	1.78	2.14	2.44	2.57	2.60	2.48	2.39	2.89	2.80	2.27	2.28	1.90	2.28
100	5.7	6.6	8.1	7.8	8.0	7.5	7.3	9.8	10.0	9.5	9.0	6.8	8.5
	1.90	2.28	2.60	2.74	2.77	2.64	2.55	3.08	2.98	2.42	2.42	2.02	2.42
200	7.1	8.2	10.1	9.8	10.0	9.3	9.1	12.2	12.4	11.6	11.2	8.5	10.5
	1.81	2.18	2.48	2.61	2.64	2.52	2.43	2.94	2.85	2.32	2.31	1.93	2.32
Freq	3.4	4.9	7.1	7.9	8.2	8.7	4.7	9.3	14.3	13.6	11.3	6.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.5	4.3	4.2	4.3	4.0	3.9	5.3	5.3	5.1	4.7	3.4	4.5
	1.49	1.78	2.03	2.12	2.13	2.06	1.97	2.39	2.30	1.89	1.89	1.53	1.92
25	3.7	4.3	5.4	5.1	5.3	4.9	4.8	6.5	6.6	6.3	5.8	4.2	5.6
	1.59	1.90	2.17	2.26	2.28	2.20	2.11	2.56	2.46	2.01	2.02	1.63	2.04
50	4.4	5.1	6.3	6.0	6.2	5.7	5.6	7.6	7.7	7.3	6.8	4.9	6.5
	1.76	2.10	2.40	2.51	2.53	2.44	2.33	2.83	2.72	2.19	2.24	1.81	2.23
100	5.3	6.1	7.5	7.2	7.4	6.8	6.7	9.0	9.1	8.7	8.2	5.9	7.8
	1.93	2.31	2.63	2.76	2.78	2.68	2.56	3.12	2.99	2.41	2.46	1.98	2.43
200	6.5	7.5	9.3	8.8	9.1	8.4	8.3	11.2	11.3	10.6	10.1	7.3	9.6
	1.85	2.21	2.52	2.64	2.66	2.56	2.45	2.98	2.86	2.31	2.35	1.90	2.35
Freq	3.1	5.2	7.3	7.9	8.2	8.7	4.2	9.9	14.8	13.4	11.1	6.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.8	3.5	3.3	3.4	3.1	3.2	4.2	4.2	4.0	3.7	2.5	3.6
	1.51	1.83	2.05	2.14	2.15	2.05	1.97	2.40	2.26	1.87	1.88	1.54	1.93
25	3.1	3.7	4.6	4.3	4.5	4.1	4.2	5.5	5.5	5.2	4.8	3.3	4.7
	1.60	1.93	2.17	2.27	2.28	2.17	2.08	2.54	2.40	1.97	2.00	1.63	2.03
50	3.8	4.5	5.5	5.2	5.4	4.9	5.0	6.6	6.6	6.3	5.8	4.0	5.6
	1.73	2.10	2.36	2.46	2.48	2.36	2.26	2.76	2.60	2.12	2.17	1.77	2.19
100	4.6	5.4	6.6	6.2	6.5	5.9	6.1	7.9	7.9	7.6	7.0	4.9	6.8
	1.97	2.39	2.69	2.81	2.83	2.69	2.58	3.15	2.97	2.40	2.47	2.02	2.46
200	5.7	6.7	8.1	7.6	7.9	7.2	7.4	9.7	9.7	9.1	8.6	6.0	8.3
	1.90	2.31	2.60	2.70	2.72	2.60	2.49	3.03	2.86	2.32	2.38	1.95	2.38
Freq	2.9	5.5	7.5	8.0	8.2	8.6	3.9	10.8	15.0	13.3	10.7	5.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	296	4.6	117	4.0	78	3.1	37
25	7.2	379	5.5	188	4.9	137	4.1	82
50	7.7	461	6.3	264	5.8	204	5.0	134
100	8.4	602	7.5	421	6.9	322	6.0	214
200	9.2	846	9.3	830	8.5	619	7.4	398

Hannover

52° 27′ 00″ N 09° 42′ 00″ E	UTM 32 E 547574 m N 5811442 m	51 m a.s.l.

Location at the airport Hannover-Langenhagen 10 km NW of Hannover in the plains of the rivers Weser and Aller. The airport is mainly surrounded by meadows, cultivated moor and woodland. The anemometer is situated between runways with the airport buildings in the E-SE sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	800	0.20										
30	0.01	900	0.20										
60	0.01	1500	0.10	3000	0.20								
90	0.01	600	0.30	1500	0.10	3500	0.20					-22	
120	0.01	300	0.15	1000	0.03	3000	0.30					-29	
150	0.01	1300	0.03	3000	0.30							-6	
180	0.01	1100	0.03	3000	0.30							-5	
210	0.01	1300	0.20	4000	0.30								
240	0.01	800	0.10	2000	0.20								
270	0.01	750	0.10	1700	0.20								
300	0.01	2000	0.20										
330	0.01	900	0.20										

Height of anemometer: 10.0 m a.g.l. Period: 70010103–79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.1	130	196	304	188	117	36	19	7	1	2	0	0	0	0	3.1	1.91
30	3.8	117	216	245	212	119	54	21	10	4	2	0	0	0	0	3.2	1.91
60	6.5	89	205	242	182	122	68	50	20	10	10	2	0	0	0	3.5	1.64
90	11.3	41	113	201	206	174	115	73	40	19	15	2	0	0	0	4.4	2.00
120	7.2	65	135	222	223	163	95	55	27	12	3	0	0	0	0	4.0	2.09
150	4.6	64	146	249	199	156	92	48	22	15	8	0	0	0	0	3.9	1.91
180	7.8	66	126	219	203	150	101	68	33	17	14	3	0	0	0	4.2	1.86
210	7.9	46	101	162	178	159	123	86	63	38	36	6	1	0	0	4.9	1.94
240	16.3	37	82	132	150	150	150	119	90	45	38	5	1	0	0	5.5	2.29
270	18.4	41	96	158	172	143	123	99	65	43	41	14	4	1	0	5.2	1.85
300	8.2	70	139	184	173	129	97	81	56	29	31	6	2	0	0	4.5	1.67
330	4.9	91	143	231	199	161	83	48	26	7	7	4	0	0	0	3.9	1.88
Total	100.0	59	124	191	184	148	108	78	49	27	24	5	1	0	0	4.5	1.79

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.4	3.9	3.9	3.4	2.8	2.4	2.6	2.5	2.9	3.2	4.6	4.6	3.4
3	4.4	3.9	4.0	3.4	2.7	2.4	2.6	2.3	2.9	3.2	4.5	4.6	3.4
6	4.3	3.9	4.1	3.6	3.1	2.9	3.1	2.5	3.0	3.3	4.5	4.7	3.6
9	4.6	4.2	5.1	4.8	4.3	3.9	4.4	3.8	4.1	4.0	4.8	4.7	4.4
12	5.1	4.9	5.8	5.4	5.0	4.6	4.8	4.5	4.8	4.6	5.5	5.3	5.0
15	4.7	4.7	5.5	5.4	4.9	4.5	4.7	4.3	4.6	4.1	4.9	4.9	4.8
18	4.5	4.0	4.3	4.3	3.8	3.7	3.8	3.1	3.1	3.4	4.7	4.8	3.9
21	4.6	4.0	4.1	3.5	2.8	2.9	2.8	2.6	3.0	3.3	4.6	4.7	3.6
Day	4.6	4.2	4.6	4.2	3.7	3.4	3.6	3.2	3.5	3.6	4.8	4.8	4.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	4.7	5.1	7.8	8.6	7.3	6.3	6.9	8.0	7.9	7.1	6.0	7.1
	2.11	2.23	1.99	2.15	2.37	2.16	2.21	2.22	2.62	2.35	2.08	2.05	2.12
25	5.5	5.2	5.5	8.5	9.4	8.0	6.8	7.6	8.7	8.6	7.7	6.5	7.8
	2.17	2.30	2.05	2.22	2.44	2.23	2.28	2.29	2.70	2.42	2.15	2.11	2.18
50	5.9	5.5	5.9	9.1	10.1	8.6	7.3	8.1	9.4	9.3	8.3	7.0	8.4
	2.23	2.36	2.10	2.28	2.50	2.29	2.34	2.35	2.78	2.49	2.21	2.17	2.23
100	6.4	6.0	6.4	9.9	10.9	9.3	8.0	8.8	10.1	10.1	9.0	7.6	9.1
	2.16	2.29	2.03	2.20	2.43	2.21	2.27	2.28	2.69	2.41	2.14	2.10	2.17
200	7.1	6.6	7.1	10.9	12.0	10.3	8.8	9.7	11.2	11.1	9.9	8.4	10.0
	2.05	2.16	1.93	2.09	2.31	2.10	2.15	2.16	2.55	2.28	2.03	1.99	2.06
Freq	3.8	3.5	5.4	9.4	8.7	5.7	6.6	7.9	13.2	17.5	12.0	6.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.3	3.5	5.8	6.1	4.5	4.4	5.0	5.6	5.4	4.6	4.1	5.0
	1.79	1.87	1.65	1.94	2.04	1.77	1.83	1.90	2.24	1.87	1.69	1.79	1.80
25	4.0	4.0	4.3	6.9	7.3	5.4	5.3	6.0	6.7	6.5	5.6	4.9	6.0
	1.93	2.03	1.78	2.09	2.18	1.92	1.98	2.05	2.42	2.02	1.83	1.94	1.93
50	4.6	4.6	4.9	8.0	8.4	6.3	6.1	6.9	7.8	7.5	6.4	5.6	6.9
	2.17	2.28	2.00	2.34	2.42	2.15	2.22	2.30	2.72	2.27	2.05	2.18	2.14
100	5.4	5.5	5.9	9.5	9.8	7.5	7.2	8.2	9.2	8.9	7.7	6.7	8.2
	2.31	2.42	2.13	2.50	2.59	2.30	2.36	2.45	2.90	2.41	2.19	2.32	2.27
200	6.8	6.8	7.3	11.7	12.1	9.3	9.0	10.2	11.5	11.1	9.5	8.3	10.2
	2.21	2.31	2.03	2.38	2.48	2.19	2.26	2.34	2.77	2.30	2.09	2.22	2.18
Freq	3.3	3.7	6.2	10.5	7.7	5.1	7.4	7.9	15.3	18.1	9.5	5.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.0	3.1	5.2	5.3	3.8	3.9	4.4	4.9	4.7	4.0	3.5	4.3
	1.92	1.90	1.65	2.01	2.05	1.83	1.86	1.91	2.26	1.85	1.72	1.83	1.82
25	3.6	3.7	3.9	6.4	6.6	4.7	4.8	5.4	6.1	5.8	4.9	4.3	5.4
	2.05	2.03	1.77	2.14	2.18	1.96	1.99	2.05	2.42	1.98	1.83	1.96	1.94
50	4.2	4.3	4.6	7.5	7.7	5.5	5.6	6.4	7.1	6.8	5.8	5.1	6.3
	2.27	2.24	1.96	2.35	2.39	2.16	2.20	2.26	2.68	2.19	2.03	2.17	2.12
100	5.0	5.1	5.4	8.9	9.1	6.6	6.7	7.6	8.4	8.1	6.9	6.1	7.5
	2.49	2.47	2.15	2.59	2.63	2.38	2.42	2.49	2.95	2.41	2.23	2.38	2.30
200	6.1	6.3	6.7	10.9	11.1	8.1	8.3	9.4	10.4	10.0	8.5	7.5	9.3
	2.39	2.36	2.06	2.48	2.52	2.28	2.32	2.38	2.82	2.31	2.13	2.28	2.22
Freq	3.2	3.8	6.4	10.9	7.3	4.9	7.7	7.9	16.0	18.3	8.5	5.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.3	2.7	4.1	4.1	2.9	3.1	3.5	3.9	3.7	3.1	2.7	3.4
	1.84	1.82	1.63	2.02	2.01	1.91	1.86	1.97	2.21	1.85	1.71	1.87	1.82
25	2.9	3.1	3.5	5.4	5.4	3.8	4.1	4.7	5.1	4.8	4.1	3.6	4.5
	1.95	1.93	1.72	2.13	2.12	2.03	1.98	2.09	2.34	1.96	1.81	1.98	1.92
50	3.5	3.7	4.3	6.5	6.5	4.6	4.9	5.6	6.1	5.8	4.9	4.4	5.5
	2.12	2.10	1.87	2.30	2.28	2.20	2.15	2.27	2.55	2.13	1.97	2.15	2.07
100	4.3	4.5	5.2	7.8	7.8	5.6	5.9	6.8	7.3	7.1	5.9	5.3	6.6
	2.42	2.39	2.13	2.61	2.59	2.51	2.44	2.59	2.90	2.42	2.24	2.45	2.32
200	5.2	5.5	6.3	9.5	9.5	6.8	7.2	8.3	9.0	8.6	7.3	6.4	8.0
	2.33	2.30	2.05	2.52	2.50	2.42	2.35	2.49	2.80	2.34	2.16	2.36	2.25
Freq	3.2	4.1	6.6	10.9	7.3	4.9	7.8	8.7	16.5	17.4	7.8	4.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.3	279	4.4	112	3.9	74	3.0	36
25	6.9	357	5.3	178	4.8	131	4.0	78
50	7.4	434	6.1	250	5.6	193	4.8	127
100	8.1	566	7.2	396	6.7	304	5.8	202
200	8.9	799	9.0	784	8.2	585	7.1	377

Helgoland

54° 11′ 00″ N 07° 54′ 00″ E	UTM 32 E 428210 m N 6004607 m	4 m a.s.l.

Location on the island of Helgoland, which is situated 70 km W of the W-coast of Schleswig-Holstein. The island has an area of 1 km². The anemometer is placed at the S-end of the island in the harbour area. There are several sheltering obstacles close by.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	250	0.20	400	0.05	1500	0.00						
30	0.03	125	0.00										
60	0.03	100	0.00										
90	0.03	125	0.00									-4	
120	0.05	100	0.00									-5	
150	0.03	100	0.00									-1	
180	0.01	100	0.00										
210	0.01	150	0.00										
240	0.01	300	0.00										
270	0.01	275	0.00										
300	0.01	300	0.00										
330	0.01	250	0.20	1500	0.00								

Height of anemometer: 15.0 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.6	13	43	111	148	172	158	136	94	47	45	21	7	3	0	6.0	2.15
30	4.4	18	55	110	142	175	114	105	89	61	66	36	19	7	3	6.2	1.76
60	7.8	11	33	69	81	118	119	115	104	82	123	73	40	19	14	7.9	1.94
90	7.6	15	39	70	86	109	104	113	118	79	146	78	31	7	5	7.9	2.26
120	8.2	14	41	66	78	106	105	110	108	102	145	74	41	10	0	8.0	2.34
150	5.7	12	37	66	98	112	124	105	113	91	128	65	28	16	6	7.7	2.12
180	7.6	13	39	56	75	77	118	118	101	77	138	97	55	19	15	8.4	2.00
210	9.4	9	27	34	62	78	86	102	103	97	162	119	72	35	13	9.3	2.35
240	12.7	9	26	45	53	67	82	96	109	102	190	121	61	28	11	9.4	2.55
270	9.5	18	24	43	71	89	83	103	116	96	168	99	49	25	16	8.9	2.26
300	11.1	10	28	61	87	104	119	102	107	92	144	83	42	12	9	8.2	2.17
330	7.3	15	29	80	98	137	142	157	122	75	91	33	13	5	1	7.0	2.33
Total	100.0	13	33	64	86	107	110	112	107	85	135	80	41	17	8	8.0	2.09

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	8.2	7.5	7.7	6.2	5.3	5.6	5.8	6.1	7.2	7.8	9.2	9.4	7.2
3	8.2	7.2	7.2	6.3	5.8	5.6	5.8	5.9	7.1	7.5	9.4	9.4	7.1
6	8.2	7.3	7.5	6.3	5.7	5.5	6.0	5.9	7.2	7.6	9.3	9.4	7.2
9	8.4	7.4	7.5	6.4	5.6	5.5	5.9	5.9	7.2	7.8	9.5	9.4	7.2
12	8.3	7.2	7.2	6.4	5.3	5.5	6.0	5.8	7.2	7.8	9.5	9.6	7.1
15	8.2	7.0	6.9	6.4	5.6	5.5	6.2	5.8	6.9	7.7	9.6	9.4	7.1
18	8.3	7.2	7.2	6.5	5.9	5.5	6.1	5.8	7.0	7.9	9.6	9.6	7.2
21	8.5	7.2	7.3	6.4	5.8	5.4	5.8	5.8	7.0	7.7	9.3	9.3	7.1
Day	8.3	7.2	7.3	6.4	5.6	5.5	6.0	5.8	7.1	7.7	9.4	9.4	7.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.1	6.0	7.6	7.9	8.1	7.5	8.1	9.0	9.1	8.6	7.9	8.8	8.1
	2.10	1.74	1.92	2.23	2.31	2.08	1.99	2.32	2.52	2.25	2.13	2.29	2.15
25	7.8	6.6	8.3	8.7	8.8	8.2	8.9	9.8	9.9	9.4	8.6	9.6	8.9
	2.16	1.79	1.98	2.30	2.38	2.15	2.04	2.38	2.59	2.31	2.20	2.35	2.21
50	8.4	7.1	8.9	9.3	9.5	8.8	9.5	10.5	10.6	10.1	9.3	10.3	9.5
	2.22	1.84	2.03	2.36	2.44	2.20	2.10	2.45	2.66	2.38	2.26	2.42	2.26
100	9.1	7.6	9.7	10.1	10.3	9.6	10.3	11.4	11.5	10.9	10.0	11.2	10.3
	2.15	1.78	1.96	2.28	2.37	2.13	2.04	2.38	2.58	2.31	2.19	2.35	2.20
200	10.0	8.4	10.7	11.2	11.4	10.6	11.3	12.5	12.7	12.0	11.1	12.3	11.4
	2.04	1.69	1.86	2.16	2.24	2.02	1.94	2.28	2.45	2.19	2.07	2.24	2.10
Freq	8.6	4.5	7.8	7.6	8.2	5.7	7.6	9.4	12.7	9.5	11.1	7.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	4.5	5.3	5.5	5.6	5.3	5.8	6.3	6.3	5.8	5.6	5.8	5.7
	1.73	1.49	1.67	1.87	1.90	1.71	1.77	2.02	2.08	1.86	1.82	1.83	1.82
25	5.8	5.4	6.4	6.6	6.7	6.4	7.0	7.5	7.5	7.0	6.7	7.0	6.8
	1.87	1.61	1.80	2.02	2.05	1.85	1.89	2.15	2.23	2.00	1.97	1.97	1.96
50	6.8	6.3	7.4	7.7	7.7	7.4	8.0	8.6	8.6	8.1	7.8	8.0	7.8
	2.10	1.81	2.02	2.27	2.30	2.08	2.10	2.38	2.48	2.24	2.21	2.19	2.18
100	8.0	7.5	8.8	9.1	9.1	8.8	9.4	10.1	10.1	9.6	9.2	9.5	9.2
	2.23	1.93	2.15	2.42	2.45	2.21	2.24	2.55	2.65	2.38	2.36	2.34	2.32
200	10.0	9.4	11.0	11.3	11.4	10.9	11.6	12.3	12.4	11.8	11.5	11.7	11.4
	2.13	1.84	2.05	2.31	2.34	2.11	2.15	2.44	2.54	2.28	2.25	2.24	2.23
Freq	7.7	5.2	7.7	7.8	7.6	6.2	8.0	10.2	12.0	9.9	10.1	7.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.0	4.7	4.8	4.8	4.7	5.1	5.5	5.5	5.0	4.9	5.0	4.9
	1.71	1.51	1.69	1.87	1.88	1.71	1.78	2.05	2.08	1.83	1.83	1.81	1.82
25	5.2	5.0	5.8	6.0	5.9	5.8	6.3	6.8	6.7	6.2	6.1	6.1	6.1
	1.83	1.61	1.80	2.01	2.01	1.83	1.89	2.17	2.21	1.96	1.96	1.93	1.94
50	6.1	5.9	6.8	7.0	7.0	6.8	7.4	7.9	7.8	7.3	7.2	7.2	7.1
	2.02	1.78	1.99	2.22	2.23	2.02	2.06	2.37	2.42	2.16	2.17	2.13	2.13
100	7.3	7.1	8.1	8.3	8.3	8.1	8.7	9.3	9.3	8.7	8.5	8.6	8.5
	2.22	1.96	2.19	2.44	2.45	2.22	2.27	2.61	2.66	2.37	2.38	2.34	2.34
200	9.0	8.7	10.0	10.3	10.3	10.0	10.6	11.3	11.3	10.6	10.5	10.6	10.4
	2.12	1.87	2.10	2.33	2.35	2.12	2.18	2.50	2.55	2.27	2.28	2.24	2.24
Freq	7.3	5.5	7.7	7.8	7.4	6.3	8.2	10.5	11.7	10.1	9.7	7.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.3	3.7	3.8	3.8	3.7	4.1	4.3	4.3	3.9	3.9	3.8	3.9
	1.69	1.55	1.72	1.88	1.86	1.70	1.83	2.05	2.05	1.81	1.86	1.77	1.82
25	4.3	4.3	4.9	5.0	5.0	4.9	5.4	5.7	5.6	5.2	5.2	5.0	5.1
	1.79	1.64	1.82	1.99	1.98	1.80	1.92	2.16	2.15	1.92	1.97	1.88	1.92
50	5.2	5.3	5.9	6.1	6.0	5.9	6.5	6.8	6.7	6.2	6.3	6.1	6.2
	1.94	1.78	1.98	2.16	2.14	1.96	2.06	2.32	2.32	2.08	2.13	2.04	2.08
100	6.3	6.4	7.1	7.3	7.2	7.1	7.7	8.1	8.1	7.5	7.6	7.3	7.4
	2.21	2.03	2.25	2.46	2.44	2.23	2.33	2.63	2.63	2.37	2.43	2.33	2.35
200	7.7	7.8	8.7	8.9	8.8	8.7	9.4	9.8	9.8	9.1	9.2	8.9	9.0
	2.13	1.96	2.17	2.37	2.35	2.15	2.26	2.55	2.55	2.28	2.34	2.24	2.28
Freq	6.8	5.9	7.7	7.9	7.1	6.6	8.4	10.9	11.3	10.3	9.2	8.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	406	5.0	164	4.4	108	3.4	52
25	7.9	519	6.0	258	5.4	189	4.5	113
50	8.4	628	6.9	358	6.3	277	5.5	183
100	9.1	816	8.2	561	7.5	429	6.6	286
200	10.1	1143	10.1	1097	9.2	821	8.0	530

Hof-Hohensaas

50° 19′ 00″ N 11° 53′ 00″ E	UTM 32 E 705273 m N 5577929 m	567 m a.s.l.

Location approximately 2.5 km W of the city centre of Hof. The terrain is undulating and has a closed appearance with small villages and forests. The anemometer is placed on the roof of a weather station (6.3 m above the 8.9 m high building). There are some buildings in the NE and W sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	3000	0.15									-14	
30	0.03	1250	0.20	3000	0.15							-7	
60	0.03	1000	0.20	4000	0.15							-4	
90	0.03	1000	0.30	4000	0.15							-7	
120	0.03	1500	0.30	4000	0.15								
150	0.03	1250	0.20									-10	
180	0.03	500	0.20									-13	
210	0.03	750	0.30	1500	0.15							-2	
240	0.03	750	0.15									-12	
270	0.03	500	0.15									-5	
300	0.03	500	0.30	1000	0.15								
330	0.03	500	0.15										

Height of anemometer: 15.2 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.4	107	158	216	193	151	93	54	17	7	4	0	0	0	0	3.8	1.97
30	9.1	84	104	175	193	167	129	90	35	18	5	0	0	0	0	4.4	2.18
60	4.5	143	146	189	194	150	89	50	26	10	3	0	0	0	0	3.8	1.94
90	3.1	165	155	181	154	121	95	68	33	7	18	2	0	0	0	3.8	1.65
120	7.1	97	158	155	160	145	104	89	48	24	17	1	0	0	0	4.4	1.88
150	10.6	84	204	248	173	132	82	43	21	10	3	0	0	0	0	3.5	1.76
180	7.8	104	175	232	224	118	73	42	22	7	4	0	0	0	0	3.6	1.88
210	10.7	60	85	178	211	179	116	80	48	22	17	4	1	0	0	4.6	2.00
240	16.3	46	86	133	159	158	127	109	71	49	45	12	3	1	0	5.4	1.97
270	12.2	62	111	144	160	147	108	103	71	38	39	14	2	1	0	5.1	1.83
300	5.6	144	180	232	186	109	77	40	19	10	4	1	0	0	0	3.4	1.67
330	5.7	102	174	225	178	124	102	47	27	10	8	2	0	0	0	3.7	1.74
Total	100.0	86	136	186	181	146	104	75	42	22	18	4	1	0	0	4.3	1.78

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.3	3.7	3.5	3.0	2.4	2.2	2.4	2.1	2.3	3.2	4.5	4.9	3.2
3	4.2	3.7	3.6	3.1	2.4	2.2	2.2	2.1	2.4	3.3	4.4	4.7	3.2
6	4.3	3.8	3.7	3.3	2.7	2.7	2.5	2.1	2.5	3.3	4.4	4.6	3.3
9	4.3	4.1	4.4	4.6	4.2	3.8	3.8	3.6	3.6	3.8	4.6	4.8	4.1
12	4.8	4.6	5.0	5.1	4.5	4.2	4.3	4.1	4.3	4.5	5.1	5.2	4.6
15	4.5	4.3	5.0	5.2	4.4	4.3	4.4	4.2	4.2	4.2	4.7	5.0	4.5
18	4.4	3.8	3.9	4.1	4.1	3.6	3.5	3.2	2.9	3.5	4.6	4.9	3.9
21	4.3	3.8	3.7	3.2	2.7	2.5	2.4	2.2	2.6	3.4	4.5	4.9	3.4
Day	4.4	4.0	4.1	4.0	3.4	3.2	3.2	2.9	3.1	3.7	4.6	4.9	3.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.9	6.5	6.2	5.8	6.2	5.8	5.9	6.7	8.3	8.3	6.6	5.4	6.7
	2.18	2.44	2.34	2.00	2.13	2.09	2.10	2.27	2.13	2.15	1.88	1.97	1.99
25	6.5	7.1	6.7	6.3	6.8	6.4	6.5	7.3	9.1	9.1	7.2	5.9	7.4
	2.25	2.51	2.42	2.06	2.20	2.16	2.16	2.35	2.19	2.21	1.94	2.03	2.05
50	6.9	7.7	7.2	6.8	7.3	6.8	7.0	7.8	9.7	9.7	7.7	6.3	7.9
	2.31	2.58	2.48	2.12	2.26	2.22	2.22	2.41	2.25	2.27	1.99	2.08	2.10
100	7.5	8.3	7.8	7.4	7.9	7.4	7.6	8.5	10.5	10.5	8.4	6.9	8.6
	2.24	2.50	2.40	2.05	2.19	2.15	2.15	2.33	2.19	2.21	1.93	2.02	2.05
200	8.3	9.2	8.7	8.1	8.8	8.2	8.4	9.4	11.5	11.5	9.2	7.6	9.5
	2.12	2.37	2.28	1.94	2.08	2.03	2.03	2.20	2.09	2.10	1.83	1.91	1.96
Freq	6.7	8.5	6.2	3.6	5.6	9.1	8.9	9.8	14.2	13.7	8.0	5.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.7	4.1	4.1	4.3	4.0	4.3	4.7	6.1	5.6	3.9	3.8	4.7
	1.89	2.08	1.88	1.62	1.82	1.75	1.80	1.92	1.90	1.79	1.54	1.67	1.72
25	5.1	5.6	4.9	4.9	5.2	4.8	5.2	5.7	7.3	6.7	4.7	4.6	5.6
	2.04	2.24	2.03	1.75	1.97	1.89	1.94	2.07	2.02	1.92	1.67	1.80	1.83
50	5.8	6.4	5.7	5.7	6.0	5.6	6.0	6.5	8.3	7.8	5.5	5.3	6.5
	2.29	2.53	2.29	1.97	2.21	2.13	2.18	2.33	2.21	2.14	1.87	2.03	2.03
100	6.9	7.7	6.7	6.8	7.1	6.6	7.1	7.8	9.7	9.1	6.6	6.3	7.7
	2.44	2.69	2.44	2.10	2.35	2.26	2.32	2.48	2.37	2.28	1.99	2.16	2.16
200	8.6	9.5	8.4	8.4	8.9	8.2	8.8	9.7	11.8	11.2	8.2	7.9	9.5
	2.33	2.56	2.33	2.00	2.25	2.16	2.22	2.37	2.28	2.19	1.90	2.06	2.10
Freq	7.1	8.9	5.1	3.3	6.7	10.1	8.1	10.5	15.5	12.7	6.4	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	4.1	3.5	3.6	3.8	3.4	3.8	4.2	5.4	4.8	3.2	3.4	4.1
	1.91	2.11	1.86	1.60	1.83	1.72	1.80	1.95	1.92	1.79	1.59	1.67	1.72
25	4.6	5.1	4.3	4.4	4.7	4.2	4.7	5.1	6.6	6.0	4.0	4.2	5.1
	2.05	2.26	1.99	1.71	1.96	1.84	1.92	2.09	2.02	1.91	1.70	1.79	1.82
50	5.3	5.9	5.0	5.3	5.5	5.0	5.5	6.0	7.7	7.0	4.7	4.9	6.0
	2.26	2.49	2.20	1.89	2.17	2.03	2.13	2.31	2.19	2.10	1.88	1.98	1.99
100	6.4	7.1	6.0	6.3	6.5	5.9	6.6	7.2	9.0	8.3	5.6	5.8	7.1
	2.49	2.74	2.42	2.08	2.38	2.23	2.34	2.54	2.40	2.31	2.07	2.17	2.17
200	7.8	8.7	7.4	7.7	8.1	7.3	8.1	8.8	10.9	10.2	6.9	7.2	8.7
	2.38	2.62	2.32	1.99	2.28	2.14	2.24	2.43	2.31	2.21	1.98	2.08	2.11
Freq	7.3	9.1	4.6	3.1	7.0	10.4	7.8	10.8	16.0	12.4	5.8	5.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.2	2.7	2.8	2.9	2.8	3.0	3.4	4.2	3.7	2.5	2.7	3.2
	1.93	2.08	1.85	1.65	1.81	1.79	1.83	1.87	1.91	1.78	1.67	1.74	1.73
25	3.9	4.2	3.6	3.8	3.9	3.7	4.0	4.4	5.5	4.9	3.3	3.6	4.3
	2.05	2.21	1.96	1.75	1.92	1.89	1.94	1.99	2.00	1.88	1.77	1.85	1.82
50	4.7	5.1	4.3	4.6	4.7	4.4	4.8	5.4	6.6	6.0	4.0	4.3	5.2
	2.22	2.40	2.13	1.90	2.09	2.06	2.11	2.16	2.13	2.04	1.92	2.01	1.96
100	5.7	6.1	5.3	5.5	5.7	5.3	5.8	6.5	7.9	7.2	4.8	5.2	6.2
	2.53	2.74	2.43	2.16	2.38	2.34	2.40	2.46	2.38	2.33	2.19	2.28	2.20
200	6.9	7.5	6.4	6.8	6.9	6.5	7.1	7.9	9.5	8.8	5.9	6.4	7.6
	2.44	2.63	2.34	2.08	2.29	2.26	2.32	2.37	2.33	2.24	2.10	2.20	2.15
Freq	7.6	8.6	4.3	3.6	7.4	10.2	8.2	11.1	16.0	11.6	5.6	5.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	250	4.2	102	3.7	67	2.9	32
25	6.5	319	5.0	161	4.5	118	3.8	70
50	7.0	386	5.8	222	5.3	173	4.6	114
100	7.6	502	6.8	347	6.3	266	5.5	179
200	8.4	704	8.4	673	7.7	504	6.7	329

List/Sylt

55° 01′ 00″ N 08° 25′ 00″ E	UTM 32 E 462698 m N 6096934 m	26 m a.s.l.

Located on the island of Sylt, which is situated 10 km W of the coast of Schleswig-Holstein. The anemometer mast is placed on the crest of a dune in an area covered by dunes. The distance to the sea is 500 m to the SW and 2500 m to the W–NW. The western slope of the dune is steep.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10	2700	0.01	5400	0.00							22	
30	0.10	2250	0.00									22	
60	0.10	2000	0.00									22	
90	0.10	750	0.00									19	
120	0.10	375	0.00									-9	
150	0.10	375	0.00									13	
180	0.10	500	0.00									20	
210	0.10	750	0.00									21	
240	0.10	1000	0.04	2500	0.10	4500	0.00					22	
270	0.10	3000	0.00									23	
300	0.10	2750	0.00									22	
330	0.10	3500	0.00									22	

Height of anemometer: 12.1 m a.g.l. Period: 71010103–80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.1	19	31	74	112	134	138	133	95	70	102	52	22	12	9	7.1	1.87
30	5.0	26	34	86	154	184	141	113	79	67	75	25	14	1	0	6.1	1.94
60	5.2	26	34	96	136	144	158	132	101	65	63	20	10	10	5	6.4	1.95
90	7.3	19	22	73	112	118	134	139	115	84	109	53	22	0	0	7.2	2.32
120	10.6	16	21	47	86	99	112	129	140	106	148	65	25	7	1	8.0	2.59
150	6.8	24	30	63	125	137	144	130	112	81	90	46	14	4	1	6.9	2.19
180	6.0	30	42	78	114	123	108	114	96	88	110	47	32	14	4	7.3	1.97
210	7.9	19	23	51	89	94	99	116	96	82	156	85	59	22	8	8.4	2.15
240	11.4	11	14	40	65	71	90	108	115	120	184	107	51	18	7	9.1	2.63
270	11.2	15	16	46	71	97	106	116	113	110	165	86	36	16	8	8.5	2.39
300	10.9	13	17	45	66	80	96	107	113	97	170	96	61	23	14	9.0	2.27
330	10.6	17	12	31	50	76	84	109	117	88	177	109	77	30	23	9.5	2.30
Total	100.0	18	22	56	90	105	112	119	111	92	140	73	39	15	8	8.0	2.15

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.2	6.4	6.9	6.6	5.8	6.0	6.6	6.1	6.9	6.6	8.5	8.4	6.8
3	7.1	6.7	7.1	6.6	5.9	5.8	6.2	6.0	6.8	6.8	8.2	8.2	6.8
6	7.3	6.7	7.1	6.6	6.0	6.1	6.4	6.1	6.8	6.8	8.0	8.3	6.9
9	7.5	6.9	7.6	7.1	6.5	6.4	6.8	6.5	7.3	7.0	8.1	8.3	7.2
12	7.5	6.9	7.9	7.6	6.9	7.0	7.4	6.8	7.6	7.3	8.5	8.6	7.5
15	7.3	6.8	7.9	7.9	7.0	7.3	7.6	7.2	7.9	7.3	8.3	8.4	7.6
18	7.5	6.6	7.3	7.5	6.7	6.7	7.1	6.7	7.3	7.2	8.1	8.3	7.2
21	7.4	6.8	7.2	6.8	5.9	6.0	6.4	6.0	7.1	7.0	8.1	8.3	6.9
Day	7.4	6.7	7.4	7.1	6.3	6.4	6.8	6.4	7.2	7.0	8.2	8.4	7.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	6.5	6.7	7.2	9.9	6.8	6.8	8.2	9.8	9.1	9.6	10.2	8.6
	1.85	1.90	1.92	2.29	2.53	2.08	1.96	2.12	2.57	2.37	2.28	2.26	2.10
25	8.6	7.2	7.3	7.9	10.8	7.5	7.4	9.0	10.7	10.0	10.4	11.2	9.4
	1.90	1.96	1.98	2.37	2.59	2.14	2.02	2.18	2.63	2.43	2.32	2.30	2.15
50	9.3	7.7	7.9	8.4	11.5	8.0	8.0	9.7	11.4	10.7	11.2	11.9	10.1
	1.95	2.01	2.03	2.43	2.66	2.20	2.07	2.24	2.70	2.49	2.38	2.37	2.21
100	10.0	8.3	8.6	9.2	12.4	8.7	8.6	10.5	12.3	11.5	12.0	12.8	10.8
	1.90	1.95	1.97	2.35	2.60	2.13	2.01	2.17	2.64	2.43	2.33	2.33	2.16
200	10.9	9.2	9.4	10.1	13.5	9.6	9.5	11.5	13.4	12.6	13.1	13.8	11.9
	1.81	1.84	1.87	2.22	2.50	2.02	1.90	2.06	2.53	2.32	2.25	2.25	2.09
Freq	7.3	5.1	5.2	7.2	10.4	7.1	6.0	7.8	11.2	11.2	10.9	10.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.5	4.8	5.5	6.7	4.6	4.9	6.1	6.8	6.5	6.9	7.1	6.0
	1.56	1.63	1.70	1.82	2.07	1.79	1.64	1.92	2.18	2.01	2.00	1.95	1.83
25	6.3	5.4	5.7	6.6	7.9	5.6	5.9	7.3	8.1	7.7	8.1	8.3	7.2
	1.67	1.76	1.83	1.96	2.19	1.93	1.77	2.05	2.31	2.13	2.10	2.03	1.94
50	7.3	6.3	6.6	7.6	9.1	6.4	6.9	8.4	9.2	8.8	9.3	9.4	8.2
	1.87	1.98	2.06	2.21	2.39	2.17	1.99	2.27	2.52	2.34	2.26	2.17	2.12
100	8.6	7.5	7.9	9.0	10.5	7.7	8.2	9.8	10.7	10.2	10.6	10.8	9.6
	1.99	2.10	2.19	2.35	2.56	2.31	2.12	2.42	2.70	2.51	2.43	2.33	2.28
200	10.7	9.4	9.8	11.2	12.6	9.5	10.2	12.0	12.9	12.4	12.6	12.7	11.7
	1.90	2.01	2.09	2.24	2.47	2.20	2.03	2.32	2.60	2.41	2.34	2.26	2.22
Freq	6.7	5.1	5.6	7.8	10.1	6.6	6.3	8.5	11.4	11.1	10.8	10.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	4.0	4.2	4.9	5.7	4.0	4.4	5.4	5.9	5.7	6.0	6.1	5.3
	1.55	1.62	1.72	1.83	2.01	1.76	1.68	1.97	2.17	2.01	2.01	1.91	1.83
25	5.6	4.9	5.2	6.1	7.0	5.0	5.5	6.7	7.2	6.9	7.4	7.4	6.5
	1.65	1.74	1.84	1.96	2.12	1.88	1.79	2.08	2.28	2.12	2.09	1.99	1.93
50	6.6	5.8	6.1	7.2	8.1	5.9	6.4	7.8	8.4	8.1	8.5	8.5	7.5
	1.82	1.92	2.03	2.17	2.29	2.08	1.98	2.27	2.46	2.29	2.23	2.10	2.08
100	7.9	6.9	7.3	8.5	9.5	7.0	7.7	9.1	9.8	9.4	9.9	9.8	8.8
	2.00	2.11	2.23	2.38	2.51	2.29	2.18	2.50	2.70	2.51	2.44	2.30	2.29
200	9.6	8.5	8.9	10.5	11.4	8.6	9.5	11.1	11.8	11.4	11.7	11.6	10.7
	1.92	2.02	2.13	2.28	2.42	2.19	2.08	2.40	2.60	2.42	2.36	2.23	2.23
Freq	6.5	5.1	5.8	8.1	9.8	6.6	6.5	8.8	11.4	11.1	10.8	9.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.1	3.3	4.1	4.3	3.2	3.6	4.4	4.6	4.5	4.8	4.6	4.1
	1.56	1.65	1.78	1.88	1.91	1.76	1.71	2.04	2.15	2.02	2.04	1.87	1.85
25	4.6	4.2	4.4	5.3	5.6	4.2	4.7	5.7	6.0	5.9	6.3	6.1	5.4
	1.65	1.75	1.88	1.99	2.00	1.86	1.81	2.13	2.24	2.11	2.11	1.94	1.93
50	5.6	5.0	5.3	6.4	6.8	5.1	5.7	6.9	7.2	7.0	7.5	7.2	6.5
	1.79	1.90	2.05	2.15	2.13	2.02	1.97	2.29	2.39	2.25	2.22	2.03	2.06
100	6.8	6.1	6.4	7.7	8.1	6.2	6.9	8.2	8.5	8.4	8.8	8.5	7.8
	2.04	2.16	2.33	2.44	2.39	2.30	2.24	2.58	2.67	2.50	2.42	2.21	2.29
200	8.3	7.4	7.8	9.4	9.7	7.5	8.4	9.9	10.3	10.0	10.4	10.1	9.4
	1.97	2.08	2.24	2.35	2.34	2.22	2.16	2.51	2.62	2.45	2.42	2.21	2.26
Freq	6.3	5.1	6.1	8.5	9.4	6.4	6.7	9.2	11.4	11.0	10.7	9.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.6	491	5.4	197	4.7	130	3.7	63
25	8.3	627	6.4	311	5.7	228	4.8	135
50	8.9	754	7.3	429	6.7	332	5.8	218
100	9.6	962	8.5	642	7.8	497	6.9	339
200	10.5	1305	10.3	1174	9.5	896	8.3	597

München

48° 08′ 00″ N	11° 43′ 00″ E	UTM 32	E 702129 m	N 5334794 m	527 m a.s.l.

Location in southern Germany at the airport München-Riem, approximately 8 km from the centre of München. The area is generally rather flat - an elevated plain - and is characterized by numerous small towns and forests alternating with open fields.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	150	0.01									-10	
30	0.03	150	0.01									-7	
60	0.03	250	0.01	1500	0.20	3000	0.03					-2	
90	0.01												
120	0.01	3500	0.30										
150	0.01	3500	0.30										
180	0.01	2100	0.30										
210	0.01	1600	0.30										
240	0.01	2500	0.30									-7	
270	0.01	1500	0.30									-28	
300	0.03	200	0.01	2000	0.30							-26	
330	0.03	200	0.01									-30	

Height of anemometer: 10.0 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.5	224	328	276	123	34	9	4	2	0	0	0	0	0	0	2.3	1.81
30	6.1	162	315	283	161	54	19	4	1	0	0	0	0	0	0	2.5	1.95
60	8.6	124	232	246	189	105	54	30	13	6	3	0	0	0	0	3.2	1.72
90	8.6	127	225	276	168	99	55	25	12	8	6	1	0	0	0	3.1	1.58
120	5.6	186	306	287	131	53	22	12	2	1	0	0	0	0	0	2.5	1.76
150	5.0	196	331	289	122	40	14	8	1	0	0	0	0	0	0	2.4	1.81
180	8.6	160	378	284	120	39	13	4	1	0	0	0	0	0	0	2.3	1.83
210	11.3	87	249	330	192	86	30	15	5	4	2	0	0	0	0	3.0	1.88
240	17.7	41	85	136	159	140	107	94	75	48	64	30	14	6	1	5.6	1.65
270	10.6	50	75	144	167	158	114	94	71	42	55	20	9	1	0	5.3	1.74
300	7.9	90	203	249	203	125	71	26	22	4	5	1	0	0	0	3.4	1.79
330	4.7	178	289	260	163	59	29	13	6	1	2	0	1	0	0	2.7	1.60
Total	100.0	116	224	241	162	95	55	38	26	15	19	8	3	1	0	3.3	1.28

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.1	3.0	3.2	2.9	2.7	2.4	2.4	2.2	2.3	2.6	3.3	3.4	2.8
3	3.2	3.1	3.2	2.9	2.6	2.3	2.4	2.1	2.3	2.5	3.3	3.5	2.8
6	3.2	3.1	3.2	2.8	2.6	2.5	2.5	2.2	2.2	2.5	3.3	3.4	2.8
9	3.3	3.3	3.6	3.7	3.4	3.2	3.0	2.8	2.8	3.2	3.5	3.5	3.3
12	3.7	3.7	4.0	4.1	3.8	3.6	3.6	3.2	3.2	3.7	4.1	3.9	3.7
15	3.7	3.8	4.2	4.4	4.2	3.9	3.9	3.5	3.4	3.7	3.9	3.8	3.9
18	3.3	3.1	3.5	3.9	3.7	3.5	3.3	3.2	2.6	2.8	3.4	3.5	3.3
21	3.3	3.0	3.2	3.1	3.0	2.7	2.5	2.5	2.4	2.6	3.4	3.4	2.9
Day	3.4	3.3	3.5	3.5	3.2	3.0	3.0	2.7	2.7	3.0	3.5	3.5	3.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.5	4.3	4.3	3.7	3.3	3.3	4.1	7.6	9.7	8.0	5.7	5.5
	1.84	2.24	2.02	1.96	1.97	2.11	2.20	2.15	1.66	1.81	1.72	1.92	1.33
25	4.1	3.8	4.7	4.7	4.1	3.7	3.7	4.5	8.3	10.6	8.7	6.3	6.0
	1.89	2.31	2.08	2.02	2.03	2.18	2.27	2.22	1.69	1.84	1.76	1.98	1.35
50	4.4	4.1	5.1	5.0	4.4	3.9	3.9	4.8	8.9	11.3	9.4	6.7	6.4
	1.94	2.37	2.13	2.07	2.08	2.24	2.33	2.28	1.74	1.87	1.80	2.03	1.37
100	4.8	4.4	5.5	5.4	4.8	4.3	4.3	5.2	9.5	12.1	10.0	7.3	6.9
	1.88	2.30	2.07	2.00	2.01	2.17	2.25	2.20	1.70	1.86	1.77	1.97	1.37
200	5.3	4.9	6.1	6.0	5.2	4.7	4.7	5.8	10.3	12.9	10.8	8.1	7.5
	1.78	2.17	1.96	1.90	1.91	2.05	2.13	2.09	1.64	1.82	1.71	1.86	1.36
Freq	5.2	5.9	7.8	8.6	6.5	5.2	7.4	10.5	16.0	12.6	8.6	5.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.5	3.1	2.9	2.5	2.3	2.3	3.0	6.0	7.5	4.9	3.6	3.8
	1.71	1.94	1.72	1.63	1.72	1.78	1.82	1.83	1.63	1.71	1.66	1.58	1.22
25	2.8	3.0	3.8	3.5	3.0	2.8	2.8	3.6	7.1	8.8	5.9	4.3	4.6
	1.84	2.09	1.85	1.76	1.86	1.92	1.97	1.98	1.70	1.76	1.79	1.71	1.27
50	3.3	3.5	4.4	4.1	3.5	3.2	3.2	4.2	8.0	9.8	6.9	5.1	5.3
	2.07	2.35	2.08	1.97	2.09	2.16	2.21	2.22	1.82	1.83	2.01	1.92	1.35
100	3.9	4.1	5.2	4.8	4.1	3.8	3.8	5.0	9.2	11.1	8.2	6.0	6.2
	2.20	2.50	2.22	2.10	2.22	2.30	2.35	2.37	1.96	1.95	2.14	2.05	1.44
200	4.9	5.1	6.4	6.0	5.1	4.7	4.8	6.2	10.9	12.6	10.2	7.5	7.5
	2.10	2.39	2.12	2.00	2.12	2.20	2.25	2.26	1.89	1.90	2.04	1.95	1.47
Freq	5.5	6.1	8.5	8.6	5.7	5.0	8.4	11.1	17.4	10.7	8.1	4.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	2.2	2.8	2.5	2.1	2.0	2.1	2.8	5.3	6.6	4.1	3.0	3.4
	1.77	1.82	1.74	1.65	1.70	1.77	1.78	1.60	1.66	1.72	1.80	1.57	1.23
25	2.5	2.8	3.4	3.2	2.7	2.5	2.6	3.5	6.5	8.0	5.1	3.7	4.1
	1.90	1.95	1.86	1.76	1.82	1.89	1.91	1.71	1.73	1.76	1.93	1.68	1.28
50	3.0	3.2	4.1	3.7	3.1	3.0	3.1	4.2	7.5	9.1	6.0	4.4	4.9
	2.10	2.16	2.06	1.95	2.01	2.10	2.11	1.89	1.83	1.82	2.13	1.86	1.34
100	3.6	3.9	4.8	4.4	3.7	3.5	3.7	5.0	8.7	10.4	7.1	5.2	5.8
	2.31	2.37	2.26	2.14	2.21	2.30	2.32	2.08	2.00	1.93	2.35	2.04	1.45
200	4.4	4.8	5.9	5.5	4.6	4.4	4.5	6.1	10.2	11.8	8.8	6.5	6.9
	2.20	2.27	2.17	2.05	2.12	2.20	2.22	1.99	1.94	1.92	2.24	1.95	1.48
Freq	5.5	6.2	8.6	8.4	5.6	5.2	8.7	11.5	17.1	10.6	7.8	4.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.7	1.8	2.1	2.0	1.7	1.6	1.8	2.5	4.3	5.0	3.2	2.2	2.6
	1.84	1.78	1.66	1.58	1.74	1.84	1.84	1.35	1.67	1.70	1.76	1.48	1.23
25	2.2	2.4	2.8	2.6	2.2	2.2	2.3	3.3	5.6	6.5	4.2	2.9	3.5
	1.95	1.89	1.76	1.68	1.85	1.95	1.95	1.43	1.73	1.73	1.86	1.57	1.27
50	2.6	2.9	3.4	3.1	2.7	2.6	2.8	4.0	6.6	7.7	5.1	3.5	4.2
	2.12	2.05	1.91	1.82	2.00	2.12	2.12	1.55	1.81	1.78	2.02	1.71	1.33
100	3.2	3.5	4.1	3.8	3.3	3.1	3.4	4.9	7.8	9.0	6.1	4.3	5.1
	2.41	2.33	2.17	2.08	2.28	2.42	2.41	1.76	1.96	1.88	2.30	1.94	1.42
200	3.9	4.3	5.0	4.6	4.0	3.8	4.1	5.9	9.3	10.4	7.5	5.2	6.1
	2.32	2.25	2.10	2.00	2.20	2.33	2.32	1.70	1.96	1.91	2.22	1.87	1.46
Freq	5.6	6.5	8.7	8.0	5.5	5.7	9.0	12.1	16.1	10.3	7.4	5.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.0	257	3.6	107	3.1	71	2.5	34
25	5.5	326	4.2	167	3.8	122	3.2	72
50	5.9	387	4.8	224	4.5	175	3.9	115
100	6.3	485	5.6	317	5.2	251	4.6	175
200	6.9	641	6.8	541	6.3	422	5.5	290

Nürnberg

49° 29′ 42″ N	11° 04′ 54″ E	UTM 32	E 650745 m	N 5484677 m	310 m a.s.l.

Location at the airport 4 km N of the centre of Nürnberg. A large forest reaches the N border of the airport. The terrain close to the anemometer is flat and open. The airport buildings appear S to SE of the anemometer.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.30										
30	0.01	600	0.30										
60	0.01	1000	0.30										
90	0.01	2000	0.30										
120	0.01	1500	0.30									-19	
150	0.01	1500	0.30									-36	
180	0.01	1000	0.30									-22	
210	0.01	1000	0.13	2000	0.30							-27	
240	0.01	1000	0.10	3000	0.30							-31	
270	0.01	1750	0.10	3000	0.30							-2	
300	0.01	700	0.30	1500	0.10	3000	0.30						
330	0.01	700	0.30										

Height of anemometer: 10.0 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.1	319	264	198	124	52	26	12	2	2	0	0	0	0	0	2.2	1.41
30	5.0	317	184	188	151	87	45	19	6	2	1	1	0	0	0	2.6	1.49
60	9.0	258	236	173	130	92	57	29	15	7	3	0	0	0	0	2.8	1.40
90	15.3	177	280	249	128	78	46	22	12	4	4	0	0	0	0	2.7	1.48
120	11.4	164	312	308	127	58	21	7	3	0	0	0	0	0	0	2.5	1.87
150	5.4	235	248	269	165	60	15	6	1	1	0	0	0	0	0	2.5	1.89
180	5.3	268	235	247	152	63	24	8	3	1	0	0	0	0	0	2.5	1.71
210	6.3	216	183	243	172	97	48	21	10	5	3	2	1	0	0	3.0	1.58
240	10.6	130	139	188	176	125	88	62	43	19	25	6	0	0	0	4.1	1.61
270	12.8	122	111	144	149	134	110	90	64	34	35	5	2	2	0	4.8	1.74
300	8.5	171	148	192	171	122	83	50	26	18	14	2	1	0	0	3.7	1.60
330	5.3	258	216	249	137	67	44	20	6	2	1	1	0	0	0	2.7	1.55
Total	100.0	199	213	219	147	91	56	34	20	10	9	2	0	0	0	3.1	1.40

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.6	2.2	2.2	2.1	2.1	1.8	1.6	1.6	1.5	1.8	2.5	2.7	2.1
3	2.5	2.2	2.3	2.0	1.8	1.7	1.4	1.4	1.4	1.8	2.5	2.7	2.0
6	2.7	2.3	2.2	2.1	2.1	1.9	1.7	1.4	1.5	1.8	2.5	2.9	2.1
9	2.9	2.9	3.5	3.6	3.3	3.2	3.0	2.7	2.4	2.6	2.9	3.1	3.0
12	3.5	3.5	4.3	4.5	4.0	4.1	3.8	3.6	3.3	3.3	3.7	3.6	3.8
15	3.3	3.6	4.2	4.5	4.2	4.0	4.0	3.9	3.3	3.2	3.3	3.4	3.7
18	2.9	2.5	2.9	3.6	3.5	3.5	3.4	2.9	2.1	2.2	2.7	3.0	2.9
21	2.7	2.5	2.4	2.6	2.2	1.8	1.8	1.8	1.7	2.1	2.6	2.8	2.3
Day	2.9	2.7	3.0	3.1	2.9	2.7	2.6	2.4	2.1	2.4	2.8	3.0	2.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.8	4.3	4.1	4.2	4.9	5.2	5.8	7.9	7.7	6.3	4.8	5.3
	1.74	1.69	1.69	1.71	1.93	2.01	2.07	1.81	1.71	1.94	1.93	1.75	1.56
25	4.1	4.2	4.7	4.5	4.6	5.4	5.7	6.3	8.6	8.4	6.9	5.2	5.8
	1.80	1.74	1.74	1.76	1.99	2.08	2.13	1.87	1.74	1.99	1.99	1.80	1.60
50	4.4	4.5	5.0	4.8	5.0	5.8	6.2	6.8	9.2	9.0	7.4	5.6	6.2
	1.85	1.78	1.79	1.80	2.05	2.13	2.19	1.92	1.78	2.05	2.05	1.85	1.63
100	4.8	4.9	5.4	5.2	5.4	6.3	6.7	7.3	9.9	9.7	8.0	6.1	6.7
	1.79	1.73	1.73	1.75	1.98	2.06	2.12	1.86	1.75	1.99	1.98	1.79	1.60
200	5.3	5.4	6.0	5.7	6.0	6.9	7.4	8.1	10.7	10.7	8.8	6.7	7.4
	1.69	1.64	1.64	1.65	1.87	1.96	2.01	1.76	1.69	1.90	1.87	1.70	1.55
Freq	5.1	5.1	7.3	12.6	12.9	8.0	5.4	5.9	8.9	12.1	10.1	6.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.8	2.9	2.8	3.1	3.7	3.5	4.2	5.9	5.1	4.1	3.0	3.7
	1.43	1.45	1.40	1.46	1.74	1.74	1.70	1.54	1.56	1.69	1.59	1.48	1.38
25	3.0	3.4	3.5	3.4	3.7	4.5	4.2	5.1	6.9	6.1	4.9	3.7	4.4
	1.54	1.56	1.51	1.57	1.87	1.87	1.83	1.67	1.63	1.83	1.72	1.59	1.46
50	3.5	3.9	4.1	3.9	4.3	5.2	4.8	5.9	7.9	7.1	5.7	4.3	5.1
	1.73	1.75	1.69	1.76	2.10	2.10	2.06	1.87	1.74	2.06	1.93	1.78	1.59
100	4.2	4.7	4.9	4.7	5.1	6.2	5.8	7.0	9.1	8.4	6.8	5.1	6.1
	1.84	1.87	1.79	1.87	2.24	2.24	2.19	1.99	1.87	2.19	2.05	1.90	1.69
200	5.2	5.8	6.1	5.8	6.4	7.7	7.2	8.7	10.6	10.5	8.5	6.3	7.5
	1.76	1.78	1.72	1.79	2.14	2.14	2.09	1.90	1.81	2.09	1.96	1.81	1.67
Freq	5.1	5.0	8.4	14.4	11.8	6.3	5.4	6.1	9.9	12.8	9.1	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.1	2.5	2.6	2.5	2.8	3.4	3.0	3.7	5.2	4.4	3.5	2.6	3.2
	1.42	1.47	1.40	1.48	1.77	1.77	1.68	1.57	1.58	1.73	1.58	1.52	1.38
25	2.6	3.1	3.2	3.1	3.4	4.2	3.7	4.6	6.3	5.4	4.3	3.2	4.0
	1.51	1.57	1.49	1.58	1.90	1.90	1.79	1.68	1.64	1.84	1.69	1.62	1.46
50	3.1	3.6	3.8	3.6	4.0	4.9	4.3	5.5	7.3	6.3	5.1	3.8	4.7
	1.67	1.73	1.65	1.75	2.10	2.10	1.99	1.86	1.73	2.04	1.87	1.79	1.57
100	3.8	4.4	4.5	4.3	4.8	5.9	5.2	6.6	8.5	7.6	6.1	4.5	5.6
	1.83	1.90	1.81	1.92	2.31	2.31	2.18	2.04	1.89	2.24	2.05	1.97	1.71
200	4.6	5.4	5.6	5.3	5.9	7.3	6.4	8.1	9.9	9.3	7.5	5.6	6.9
	1.76	1.82	1.73	1.84	2.21	2.21	2.09	1.95	1.83	2.14	1.96	1.89	1.68
Freq	5.1	5.0	8.8	15.0	11.3	5.7	5.4	6.2	10.2	13.1	8.7	5.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.7	2.0	2.0	2.0	2.2	2.8	2.3	3.0	4.1	3.3	2.7	1.9	2.5
	1.46	1.46	1.40	1.48	1.78	1.80	1.65	1.55	1.60	1.73	1.59	1.50	1.39
25	2.3	2.6	2.7	2.6	2.9	3.6	3.1	4.0	5.3	4.4	3.5	2.6	3.4
	1.54	1.55	1.49	1.57	1.88	1.90	1.75	1.64	1.65	1.83	1.69	1.59	1.45
50	2.8	3.2	3.2	3.1	3.5	4.4	3.8	4.9	6.3	5.3	4.3	3.1	4.1
	1.68	1.68	1.61	1.70	2.05	2.07	1.90	1.78	1.73	1.99	1.83	1.72	1.54
100	3.4	3.8	3.9	3.8	4.3	5.3	4.6	5.9	7.5	6.4	5.2	3.8	4.9
	1.91	1.91	1.83	1.94	2.33	2.36	2.17	2.03	1.88	2.26	2.08	1.96	1.70
200	4.1	4.7	4.8	4.6	5.2	6.5	5.6	7.2	8.8	7.9	6.3	4.6	6.0
	1.84	1.84	1.77	1.87	2.25	2.27	2.09	1.96	1.88	2.18	2.01	1.89	1.69
Freq	5.1	5.4	9.6	14.6	10.8	5.5	5.3	6.4	11.2	12.4	8.2	5.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.8	169	3.4	71	2.9	47	2.3	23
25	5.2	214	4.0	111	3.6	82	3.0	49
50	5.6	257	4.6	150	4.2	117	3.7	78
100	6.0	334	5.5	228	5.0	176	4.4	119
200	6.7	466	6.7	437	6.1	329	5.3	215

Saarbrücken

49° 13′ 11″ N	07° 06′ 44″ E	UTM 32	E 362528 m	N 5453705 m	323 m a.s.l.

Located at the airport, 10 km E of the centre of Saarbrücken. The airport is situated on a flat plain, whereas the surrounding landscape is characterized by forested hills. The anemometer is located N of the runway and the airport buildings appear in the NE sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	150	0.20										
30	0.01	250	0.20									-14	
60	0.01	600	0.20									-11	
90	0.01	700	0.30										
120	0.01	1300	0.30										
150	0.01	750	0.30										
180	0.01	700	0.20										
210	0.01	700	0.20										
240	0.01	1000	0.20										
270	0.20											-6	
300	0.01	100	0.20									-24	
330	0.01	100	0.20									-6	

Height of anemometer: 10.0 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	3.6	251	205	263	150	89	29	10	3	0	0	0	0	0	0	2.7	1.81
30	13.4	78	86	180	232	209	113	61	25	12	6	0	0	0	0	4.3	2.35
60	14.8	73	99	185	227	182	105	71	36	14	7	0	0	0	0	4.3	2.16
90	7.2	132	171	235	201	118	71	43	16	8	3	0	0	0	0	3.5	1.81
120	3.5	232	233	230	168	80	38	14	4	1	0	0	0	0	0	2.7	1.72
150	3.3	283	212	249	155	67	20	11	2	1	0	0	0	0	0	2.5	1.73
180	7.7	154	141	190	200	144	81	55	24	5	5	0	0	0	0	3.7	1.93
210	12.9	77	99	163	158	168	123	88	56	31	31	5	2	0	0	4.8	1.94
240	15.8	82	113	176	168	163	121	78	46	24	22	4	1	0	0	4.6	1.93
270	9.7	152	173	188	191	116	86	45	23	13	12	1	0	0	0	3.6	1.69
300	5.0	239	219	215	159	101	34	19	12	1	1	0	0	0	0	2.8	1.62
330	3.1	290	216	251	130	77	26	6	3	1	1	0	0	0	0	2.5	1.66
Total	100.0	128	137	194	188	149	91	56	29	14	11	1	0	0	0	3.9	1.82

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.8	3.6	3.4	2.9	2.8	2.2	2.2	2.3	2.3	2.7	3.5	3.7	3.0
3	3.9	3.5	3.4	3.0	2.8	2.3	2.1	2.2	2.3	2.7	3.4	3.9	3.0
6	3.8	3.6	3.4	3.2	3.1	2.5	2.4	2.3	2.5	2.9	3.5	4.0	3.1
9	3.8	3.7	4.0	4.1	4.0	3.5	3.3	3.3	3.2	3.3	3.6	4.0	3.6
12	4.1	4.2	4.5	4.7	4.4	3.8	3.8	3.9	3.9	3.8	4.1	4.3	4.1
15	4.1	4.1	4.4	4.5	4.1	3.8	3.7	3.7	3.7	3.6	3.9	4.1	4.0
18	3.8	3.6	3.6	3.7	3.5	3.2	3.1	2.9	2.6	2.9	3.5	3.8	3.4
21	3.8	3.6	3.4	3.0	2.8	2.3	2.3	2.2	2.5	2.9	3.5	3.8	3.0
Day	3.9	3.7	3.7	3.6	3.4	2.9	2.8	2.8	2.9	3.1	3.6	3.9	3.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	7.9	7.7	6.4	4.7	3.9	5.3	6.9	6.9	6.9	6.9	5.7	6.6
	2.05	2.60	2.62	2.31	2.03	2.02	2.14	2.20	2.30	2.08	1.94	1.79	2.12
25	5.3	8.6	8.4	7.0	5.1	4.3	5.7	7.5	7.6	7.6	7.5	6.3	7.3
	2.11	2.69	2.71	2.39	2.09	2.08	2.20	2.28	2.37	2.15	2.00	1.85	2.17
50	5.7	9.3	9.0	7.5	5.5	4.6	6.2	8.1	8.2	8.1	8.1	6.7	7.8
	2.17	2.76	2.78	2.45	2.15	2.14	2.26	2.33	2.43	2.20	2.05	1.89	2.22
100	6.1	10.1	9.8	8.2	6.0	4.9	6.7	8.8	8.9	8.8	8.8	7.3	8.5
	2.10	2.67	2.69	2.37	2.08	2.07	2.19	2.26	2.35	2.13	1.99	1.83	2.16
200	6.8	11.1	10.8	9.0	6.6	5.5	7.4	9.7	9.8	9.7	9.7	8.0	9.4
	1.99	2.53	2.55	2.25	1.97	1.96	2.08	2.14	2.23	2.02	1.88	1.74	2.06
Freq	3.4	9.5	14.3	10.2	5.0	3.4	6.0	11.0	14.6	11.9	6.9	4.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	5.7	5.2	4.1	3.0	2.7	3.8	5.0	4.8	4.9	4.7	3.6	4.6
	1.74	2.27	2.17	1.83	1.67	1.67	1.85	1.89	1.91	1.69	1.61	1.53	1.79
25	4.0	6.8	6.2	4.9	3.6	3.2	4.6	6.0	5.7	5.9	5.7	4.4	5.5
	1.88	2.45	2.34	1.98	1.81	1.81	2.00	2.04	2.06	1.82	1.74	1.65	1.92
50	4.7	7.9	7.2	5.7	4.2	3.8	5.3	6.9	6.6	6.8	6.6	5.1	6.4
	2.11	2.76	2.63	2.22	2.03	2.03	2.25	2.29	2.32	2.05	1.95	1.85	2.14
100	5.6	9.3	8.5	6.7	5.0	4.5	6.3	8.2	7.8	8.1	7.8	6.0	7.6
	2.25	2.94	2.80	2.36	2.16	2.16	2.40	2.44	2.47	2.18	2.08	1.97	2.26
200	6.9	11.6	10.6	8.3	6.2	5.6	7.9	10.2	9.7	10.1	9.7	7.5	9.5
	2.15	2.81	2.67	2.26	2.06	2.06	2.29	2.33	2.36	2.08	1.98	1.88	2.17
Freq	3.5	11.9	14.7	8.4	4.0	3.3	7.1	12.2	15.4	10.3	5.7	3.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	5.0	4.5	3.4	2.5	2.3	3.4	4.4	4.1	4.3	4.1	3.0	4.0
	1.73	2.33	2.12	1.79	1.68	1.69	1.87	1.91	1.91	1.68	1.61	1.55	1.79
25	3.6	6.2	5.5	4.2	3.1	2.9	4.2	5.4	5.1	5.3	5.1	3.8	5.0
	1.85	2.49	2.27	1.92	1.79	1.80	2.01	2.05	2.04	1.79	1.72	1.66	1.91
50	4.3	7.3	6.5	4.9	3.7	3.4	4.9	6.4	6.0	6.3	6.0	4.4	5.9
	2.05	2.76	2.52	2.12	1.99	1.99	2.22	2.26	2.26	1.99	1.90	1.83	2.09
100	5.1	8.6	7.7	5.8	4.4	4.1	5.9	7.6	7.1	7.5	7.2	5.3	7.0
	2.25	3.03	2.76	2.33	2.18	2.19	2.44	2.49	2.49	2.18	2.09	2.01	2.27
200	6.3	10.6	9.5	7.2	5.4	5.1	7.2	9.4	8.8	9.2	8.8	6.6	8.6
	2.15	2.90	2.65	2.23	2.09	2.10	2.33	2.38	2.38	2.09	2.00	1.93	2.19
Freq	3.6	12.7	14.9	7.7	3.7	3.3	7.5	12.7	15.7	9.7	5.2	3.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	3.9	3.5	2.6	1.9	2.0	2.8	3.5	3.2	3.4	3.2	2.3	3.2
	1.73	2.30	2.12	1.81	1.68	1.63	1.87	1.93	1.90	1.67	1.59	1.63	1.81
25	3.5	5.2	4.6	3.4	2.5	2.6	3.7	4.6	4.3	4.5	4.2	3.0	4.2
	1.83	2.44	2.24	1.92	1.78	1.73	1.98	2.04	2.02	1.77	1.69	1.73	1.90
50	4.2	6.3	5.5	4.1	3.1	3.2	4.4	5.5	5.2	5.4	5.1	3.7	5.1
	1.99	2.65	2.44	2.08	1.93	1.88	2.15	2.22	2.19	1.92	1.83	1.87	2.05
100	5.1	7.5	6.6	4.9	3.7	3.8	5.4	6.6	6.2	6.6	6.2	4.5	6.1
	2.27	3.02	2.78	2.38	2.20	2.14	2.45	2.53	2.50	2.19	2.08	2.13	2.29
200	6.2	9.2	8.1	6.0	4.5	4.7	6.6	8.1	7.6	8.0	7.5	5.5	7.5
	2.19	2.91	2.68	2.29	2.12	2.06	2.36	2.44	2.41	2.11	2.01	2.05	2.22
Freq	4.2	13.7	14.3	6.9	3.5	3.7	8.1	13.2	14.9	9.3	5.0	3.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.9	225	4.1	91	3.6	60	2.8	29
25	6.4	288	4.9	144	4.4	106	3.7	63
50	6.9	350	5.7	202	5.2	156	4.5	103
100	7.5	457	6.8	322	6.2	246	5.4	164
200	8.3	647	8.4	642	7.6	478	6.6	307

Stuttgart

48° 41′ 00″ N	09° 13′ 00″ E	UTM 32	E 515948 m	N 5392383 m	373 m a.s.l.

Location at the airport 10 km S of the city of Stuttgart on a high plain. The surrounding landscape is characterized by hills, forests and many villages. The city of Bernhausen extends to the S boundary of the airport where the anemometer is situated. Except for the southern sector the area around the anemometer has an open and flat appearance.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.10	1100	0.30								
30	0.01	600	0.10										
60	0.01	1000	0.10	3000	0.30								
90	0.01	2500	0.10										
120	0.01	300	0.10										
150	0.01	150	0.10									-10	
180	0.01	150	0.10	500	0.30							-20	
210	0.01	50	0.10	300	0.30							-12	
240	0.01	100	0.10	600	0.20								
270	0.01	2400	0.10	5000	0.20								
300	0.01	1800	0.10	3000	0.20								
330	0.01	500	0.10										

Height of anemometer: 10.0 m a.g.l. Period: 72010103–81123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.1	327	179	242	156	68	21	5	1	1	0	0	0	0	0	2.5	1.74
30	6.6	297	220	245	144	59	22	9	3	1	0	0	0	0	0	2.4	1.67
60	6.1	330	191	164	123	92	54	24	17	5	1	1	0	0	0	2.6	1.35
90	9.1	304	261	163	108	72	49	25	11	4	2	0	0	0	0	2.4	1.26
120	5.5	417	289	147	72	42	19	7	4	2	1	0	0	0	0	1.8	1.17
150	3.6	570	263	118	32	13	2	2	0	1	0	0	0	0	0	1.2	1.15
180	4.6	496	282	148	51	20	2	1	0	0	0	0	0	0	0	1.5	1.32
210	7.1	314	261	199	110	60	29	17	8	1	0	0	0	0	0	2.2	1.36
240	20.6	146	161	174	159	123	90	61	39	19	20	8	2	0	0	4.0	1.55
270	12.1	245	167	123	128	97	76	62	39	24	26	9	4	2	0	3.7	1.32
300	9.5	334	190	139	107	80	56	44	22	12	12	3	0	0	0	2.7	1.19
330	7.9	292	193	189	150	97	46	20	8	3	1	0	0	0	0	2.7	1.54
Total	100.0	294	206	170	123	81	51	32	19	9	9	3	1	0	0	2.8	1.24

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.4	1.9	2.2	2.2	1.6	1.5	1.6	1.3	1.3	1.5	2.2	2.5	1.8
3	2.4	1.8	2.0	2.0	1.4	1.5	1.4	1.0	1.2	1.5	2.3	2.5	1.8
6	2.2	2.0	2.0	2.0	1.5	1.6	1.4	1.0	1.2	1.5	2.2	2.6	1.8
9	2.4	2.3	2.8	3.2	3.0	2.9	2.7	2.2	2.2	2.2	2.6	2.6	2.6
12	3.0	2.9	3.8	4.1	3.9	3.5	3.5	3.1	3.0	3.1	3.4	3.2	3.4
15	3.0	3.1	4.2	4.5	3.9	3.7	3.7	3.4	3.2	3.2	3.3	3.1	3.5
18	2.5	2.4	3.1	3.6	3.4	3.0	3.1	2.5	2.1	2.2	2.6	2.7	2.8
21	2.4	2.0	2.4	2.3	1.9	1.7	1.9	1.6	1.5	1.7	2.4	2.5	2.0
Day	2.5	2.3	2.8	3.0	2.6	2.4	2.4	2.0	2.0	2.1	2.6	2.7	2.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	3.6	3.8	3.6	3.0	2.5	2.9	4.3	6.7	6.1	4.5	4.0	4.5
	1.92	1.96	1.65	1.53	1.43	1.36	1.44	1.53	1.78	1.68	1.45	1.60	1.42
25	4.3	4.0	4.2	3.9	3.3	2.8	3.2	4.8	7.3	6.7	5.0	4.4	4.9
	1.99	2.02	1.71	1.58	1.48	1.40	1.48	1.58	1.83	1.73	1.50	1.64	1.46
50	4.6	4.3	4.5	4.2	3.6	3.0	3.4	5.2	7.9	7.2	5.4	4.7	5.3
	2.04	2.07	1.75	1.62	1.51	1.44	1.52	1.62	1.88	1.77	1.54	1.69	1.49
100	4.9	4.6	4.8	4.6	3.9	3.2	3.7	5.6	8.6	7.8	5.8	5.1	5.7
	1.98	2.01	1.69	1.57	1.47	1.39	1.48	1.57	1.82	1.72	1.49	1.63	1.45
200	5.5	5.1	5.3	5.0	4.3	3.5	4.1	6.1	9.4	8.6	6.4	5.6	6.3
	1.87	1.90	1.61	1.49	1.39	1.32	1.40	1.49	1.73	1.63	1.41	1.55	1.39
Freq	7.4	6.8	6.3	7.9	6.9	4.3	4.2	6.2	15.7	15.4	10.4	8.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.5	2.7	2.3	1.9	1.7	2.2	3.2	4.7	3.9	2.8	2.8	3.1
	1.64	1.64	1.35	1.26	1.16	1.19	1.27	1.33	1.52	1.35	1.20	1.46	1.24
25	3.2	3.0	3.2	2.8	2.3	2.1	2.6	3.8	5.7	4.7	3.5	3.4	3.7
	1.77	1.77	1.45	1.36	1.24	1.28	1.36	1.43	1.64	1.46	1.29	1.57	1.32
50	3.7	3.5	3.8	3.3	2.8	2.4	3.1	4.5	6.6	5.5	4.1	3.9	4.4
	1.99	1.99	1.62	1.52	1.39	1.44	1.52	1.60	1.85	1.63	1.44	1.76	1.45
100	4.4	4.1	4.5	4.0	3.3	2.9	3.7	5.4	7.9	6.5	4.9	4.7	5.2
	2.12	2.12	1.73	1.62	1.48	1.52	1.62	1.70	1.96	1.74	1.53	1.88	1.52
200	5.5	5.2	5.6	4.9	4.1	3.6	4.6	6.7	9.8	8.1	6.0	5.8	6.5
	2.02	2.03	1.65	1.55	1.42	1.46	1.55	1.63	1.88	1.66	1.47	1.79	1.47
Freq	7.2	6.7	6.2	8.8	5.9	3.8	4.4	6.8	19.1	13.4	9.8	8.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.2	2.4	2.0	1.7	1.4	2.0	2.9	4.2	3.2	2.4	2.5	2.7
	1.70	1.61	1.34	1.27	1.18	1.17	1.32	1.37	1.53	1.32	1.20	1.51	1.24
25	2.9	2.7	3.0	2.5	2.1	1.8	2.5	3.6	5.2	4.0	3.0	3.1	3.4
	1.81	1.73	1.43	1.36	1.26	1.25	1.41	1.46	1.64	1.41	1.28	1.62	1.32
50	3.4	3.2	3.5	3.0	2.5	2.1	2.9	4.2	6.1	4.8	3.6	3.6	4.0
	2.01	1.91	1.58	1.50	1.39	1.38	1.56	1.62	1.81	1.56	1.41	1.79	1.43
100	4.1	3.8	4.2	3.7	3.1	2.6	3.5	5.1	7.3	5.8	4.4	4.3	4.8
	2.20	2.10	1.73	1.65	1.52	1.51	1.71	1.77	1.99	1.71	1.54	1.96	1.54
200	5.0	4.7	5.2	4.5	3.8	3.2	4.3	6.3	9.0	7.1	5.3	5.3	5.9
	2.11	2.01	1.65	1.58	1.46	1.45	1.64	1.70	1.90	1.63	1.48	1.88	1.49
Freq	7.1	6.7	6.1	9.1	5.5	3.6	4.5	7.0	20.4	12.6	9.5	7.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	1.7	1.8	1.6	1.4	1.1	1.6	2.5	3.2	2.5	1.9	1.9	2.1
	1.63	1.55	1.33	1.32	1.21	1.15	1.30	1.37	1.52	1.31	1.23	1.53	1.26
25	2.4	2.3	2.4	2.2	1.8	1.5	2.2	3.3	4.3	3.3	2.6	2.6	2.8
	1.73	1.64	1.41	1.40	1.28	1.22	1.37	1.46	1.62	1.38	1.30	1.62	1.31
50	2.9	2.8	3.0	2.7	2.2	1.9	2.7	4.0	5.2	4.0	3.1	3.1	3.5
	1.88	1.78	1.52	1.52	1.39	1.31	1.49	1.58	1.75	1.50	1.40	1.76	1.41
100	3.5	3.3	3.6	3.3	2.7	2.3	3.3	4.8	6.3	4.9	3.8	3.8	4.2
	2.14	2.03	1.73	1.73	1.58	1.49	1.69	1.79	1.99	1.71	1.60	2.00	1.56
200	4.3	4.1	4.4	4.0	3.3	2.8	4.0	5.9	7.7	6.0	4.7	4.6	5.2
	2.06	1.96	1.67	1.66	1.52	1.44	1.63	1.73	1.92	1.64	1.54	1.93	1.51
Freq	7.1	6.5	6.6	8.6	5.2	3.6	4.8	8.6	20.1	11.8	9.3	7.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.1	122	2.9	54	2.5	36	2.0	17
25	4.5	155	3.4	83	3.1	61	2.6	36
50	4.8	186	4.0	110	3.6	86	3.2	57
100	5.2	247	4.7	170	4.3	131	3.8	86
200	5.8	356	5.9	347	5.4	259	4.7	165

Weißenburg

49° 01′ 13″ N 10° 57′ 42″ E	UTM 32 E 643425 m N 5431672 m	422 m a.s.l.

Weather station at the southern edge of the city of Weißenburg. The landscape is undulating but has an open appearance. There are many buildings close to the anemometer.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	800	0.20	1250	0.05							-22	13
30	0.03	150	0.30	3000	0.15							15	6
60	0.03	100	0.30	2500	0.10							16	-7
90	0.01	100	0.30	300	0.05	800	0.30					-4	-15
120	0.30	200	0.05	700	0.30							-28	-10
150	0.30	200	0.05	750	0.30							-29	11
180	0.03	1100	0.20									-16	14
210	0.03	250	0.30	1000	0.10								6
240	0.03	2000	0.10									1	-6
270	0.03	1750	0.10									-24	-13
300	0.03	3000	0.10									-37	-7
330	0.03	1500	0.10									-27	9

Height of anemometer: 10.1 m a.g.l. Period: 71010103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.5	313	317	254	97	14	4	0	0	0	0	0	0	0	0	2.0	1.83
30	8.6	231	253	272	174	57	11	2	1	0	0	0	0	0	0	2.5	2.00
60	6.3	221	201	207	183	118	49	16	3	1	1	0	0	0	0	2.9	1.81
90	5.1	279	210	193	145	89	34	28	8	10	4	0	0	0	0	2.7	1.42
120	4.2	296	173	153	97	65	50	59	37	29	34	5	1	0	0	3.1	1.13
150	6.2	421	180	160	99	54	31	22	16	7	8	2	1	0	0	2.2	1.07
180	11.6	337	173	183	143	85	46	22	7	3	1	0	0	0	0	2.6	1.46
210	25.6	252	168	188	156	104	60	36	16	10	7	1	0	0	0	3.1	1.49
240	11.0	225	136	136	141	125	92	59	32	29	21	4	0	0	0	3.9	1.56
270	9.6	231	157	164	145	122	74	53	26	15	11	1	0	0	0	3.5	1.53
300	4.2	301	213	168	149	87	47	18	11	3	3	0	0	0	0	2.6	1.43
330	4.2	333	307	201	98	44	11	4	1	1	0	0	0	0	0	2.0	1.47
Total	100.0	275	190	187	144	91	50	31	15	10	8	1	0	0	0	2.9	1.39

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.8	2.3	2.4	2.1	1.8	1.3	1.3	1.5	1.6	2.0	2.8	3.0	2.1
3	2.9	2.2	2.2	2.0	1.6	1.3	1.3	1.3	1.4	1.8	2.8	2.8	2.0
6	2.9	2.3	2.3	2.0	1.7	1.6	1.6	1.4	1.5	1.8	2.9	3.1	2.1
9	2.9	2.4	3.1	3.1	3.0	2.8	2.8	2.4	2.4	2.5	3.1	3.1	2.8
12	3.2	3.0	3.7	3.8	3.4	3.3	3.2	3.1	3.1	3.2	3.5	3.4	3.3
15	3.1	3.0	3.7	3.8	3.5	3.3	3.2	3.1	3.0	3.0	3.1	3.2	3.3
18	2.8	2.3	2.6	2.7	2.6	2.4	2.3	2.1	2.0	2.0	2.9	3.2	2.5
21	2.8	2.4	2.6	2.1	2.0	1.5	1.4	1.6	1.6	2.1	3.0	3.2	2.2
Day	2.9	2.5	2.8	2.7	2.4	2.2	2.2	2.1	2.1	2.3	3.0	3.1	2.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.0	4.4	5.4	6.6	6.5	5.8	5.5	5.5	6.7	6.8	5.3	5.6
	1.99	2.29	2.11	1.87	1.25	1.33	1.60	1.76	1.76	1.80	1.71	1.53	1.51
25	4.5	4.4	4.8	5.9	7.2	7.1	6.4	6.0	6.0	7.3	7.5	5.8	6.2
	2.05	2.36	2.18	1.92	1.27	1.35	1.65	1.81	1.81	1.86	1.76	1.58	1.54
50	4.8	4.7	5.2	6.3	7.7	7.6	6.9	6.4	6.4	7.8	8.0	6.2	6.6
	2.11	2.42	2.24	1.98	1.29	1.38	1.70	1.86	1.86	1.90	1.80	1.62	1.58
100	5.2	5.1	5.6	6.9	8.3	8.1	7.4	7.0	7.0	8.5	8.7	6.7	7.2
	2.04	2.35	2.17	1.91	1.28	1.36	1.64	1.80	1.80	1.85	1.76	1.57	1.55
200	5.8	5.7	6.2	7.6	8.8	8.7	8.2	7.7	7.7	9.4	9.5	7.4	7.9
	1.93	2.22	2.05	1.81	1.26	1.32	1.56	1.71	1.71	1.75	1.67	1.49	1.50
Freq	5.2	5.5	4.8	4.8	5.9	8.9	13.6	16.5	11.4	8.9	8.3	6.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.8	3.2	3.8	5.0	4.3	3.9	3.7	3.9	4.7	4.7	3.2	3.9
	1.76	1.90	1.76	1.55	1.15	1.20	1.42	1.49	1.52	1.52	1.44	1.35	1.31
25	3.4	3.4	3.9	4.6	5.8	5.1	4.7	4.5	4.8	5.7	5.7	3.8	4.7
	1.90	2.05	1.90	1.67	1.18	1.25	1.52	1.60	1.63	1.64	1.53	1.45	1.39
50	3.9	3.9	4.5	5.4	6.6	5.9	5.5	5.3	5.5	6.6	6.6	4.5	5.4
	2.14	2.31	2.14	1.87	1.23	1.34	1.71	1.80	1.83	1.84	1.69	1.63	1.52
100	4.6	4.7	5.4	6.4	7.5	6.9	6.5	6.3	6.6	7.9	7.8	5.4	6.5
	2.28	2.46	2.28	1.99	1.30	1.44	1.82	1.92	1.96	1.96	1.81	1.73	1.64
200	5.8	5.8	6.7	8.0	8.5	8.1	8.1	7.8	8.2	9.8	9.4	6.6	7.9
	2.18	2.35	2.17	1.90	1.27	1.39	1.74	1.83	1.87	1.87	1.74	1.65	1.61
Freq	5.1	5.7	4.3	5.1	6.2	10.1	14.9	17.1	8.8	9.4	7.7	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.5	2.9	3.4	4.4	3.7	3.4	3.2	3.5	4.2	4.1	2.7	3.4
	1.78	1.98	1.80	1.54	1.17	1.21	1.44	1.48	1.54	1.53	1.44	1.47	1.31
25	3.0	3.0	3.6	4.2	5.4	4.6	4.2	4.0	4.4	5.2	5.1	3.3	4.2
	1.91	2.12	1.93	1.65	1.19	1.26	1.54	1.58	1.65	1.64	1.52	1.57	1.38
50	3.5	3.6	4.2	4.9	6.2	5.3	4.9	4.8	5.2	6.1	6.0	4.0	5.0
	2.11	2.35	2.13	1.83	1.23	1.33	1.70	1.74	1.82	1.81	1.65	1.74	1.50
100	4.2	4.3	5.0	5.9	7.1	6.3	5.9	5.7	6.2	7.3	7.1	4.7	5.9
	2.32	2.58	2.34	2.01	1.30	1.46	1.87	1.92	2.00	1.99	1.82	1.91	1.64
200	5.2	5.3	6.2	7.3	8.1	7.4	7.3	7.0	7.6	9.0	8.6	5.8	7.2
	2.22	2.47	2.24	1.92	1.29	1.41	1.79	1.83	1.92	1.90	1.75	1.83	1.62
Freq	5.0	5.8	4.2	5.2	6.2	10.6	15.3	17.4	7.8	9.6	7.5	5.5	100.0

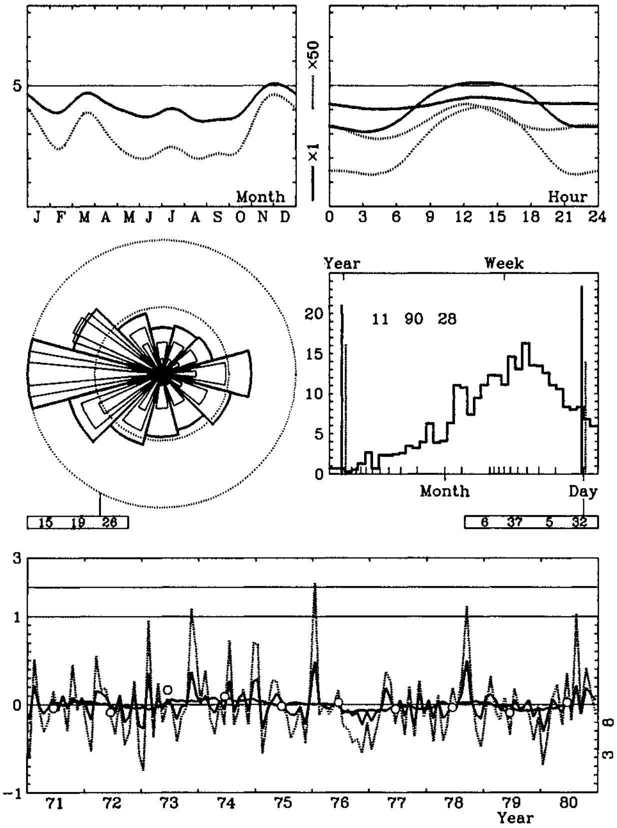
Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	2.0	2.3	2.8	3.4	2.8	2.6	2.6	2.8	3.3	3.2	2.0	2.7
	1.81	1.88	1.72	1.43	1.17	1.22	1.47	1.51	1.54	1.53	1.40	1.53	1.32
25	2.5	2.6	3.1	3.7	4.4	3.7	3.5	3.4	3.8	4.3	4.2	2.7	3.5
	1.92	1.99	1.82	1.51	1.19	1.27	1.55	1.60	1.63	1.62	1.48	1.62	1.38
50	3.1	3.2	3.7	4.4	5.3	4.5	4.3	4.2	4.6	5.3	5.0	3.3	4.3
	2.08	2.17	1.98	1.64	1.23	1.34	1.69	1.74	1.77	1.75	1.58	1.76	1.48
100	3.7	3.8	4.5	5.4	6.2	5.5	5.2	5.1	5.6	6.4	6.1	4.0	5.2
	2.37	2.47	2.25	1.87	1.29	1.48	1.92	1.98	2.02	1.99	1.78	2.00	1.64
200	4.6	4.7	5.5	6.6	7.2	6.5	6.3	6.2	6.8	7.8	7.3	4.8	6.3
	2.29	2.38	2.17	1.80	1.31	1.46	1.85	1.91	1.95	1.92	1.73	1.93	1.63
Freq	5.1	5.5	4.2	5.3	6.8	11.7	15.6	16.0	7.7	9.4	7.4	5.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.1	217	3.6	95	3.1	63	2.5	30
25	5.6	275	4.3	146	3.8	107	3.2	64
50	6.0	328	4.9	193	4.5	150	3.9	100
100	6.5	425	5.8	284	5.3	219	4.7	150
200	7.1	593	7.1	536	6.5	405	5.7	268

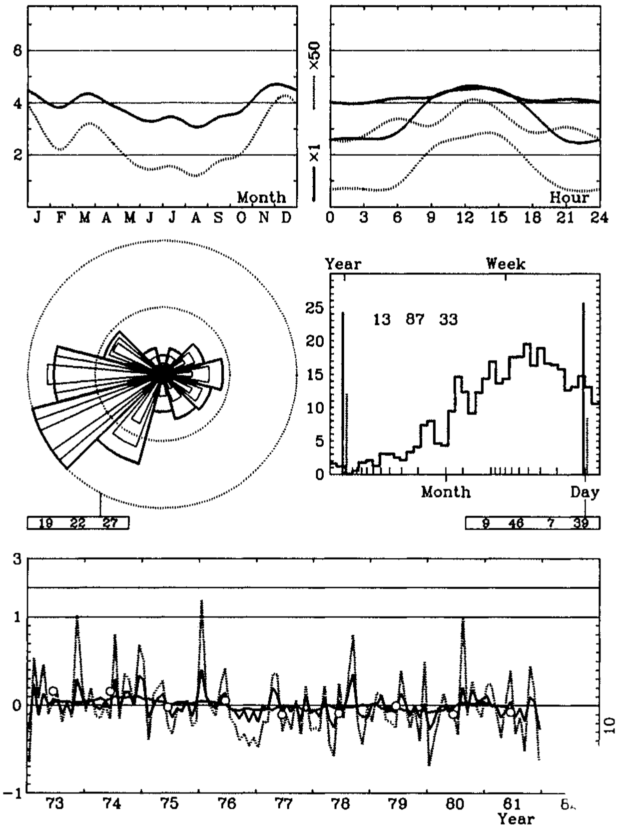
Berlin, Germany (FRG) 1971–80

10.0 m agl, mean 4.1 m/s, st dev 2.3 m/s, cube 145. m^3/s^3



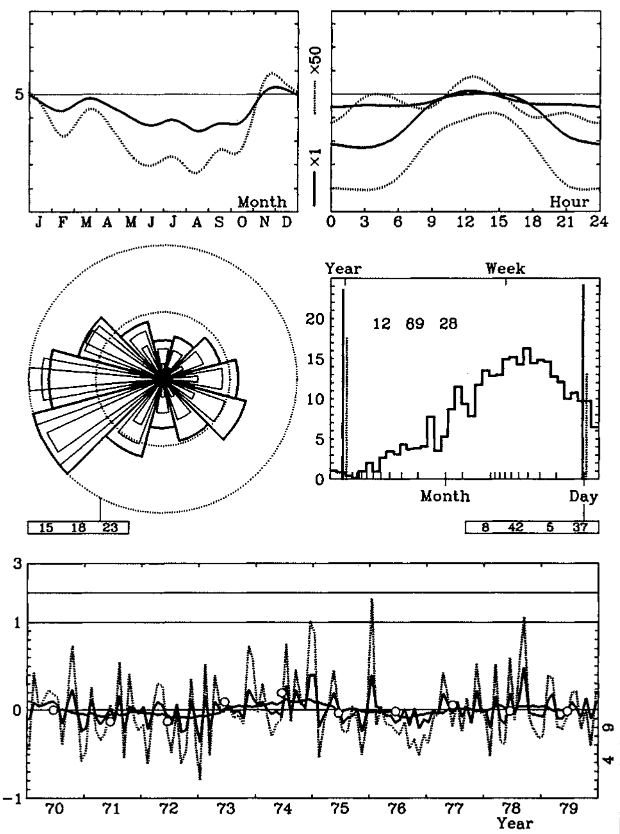
Braunschweig, Germany (FRG) 1973–81

10.0 m agl, mean 3.8 m/s, st dev 2.2 m/s, cube 120. m^3/s^3



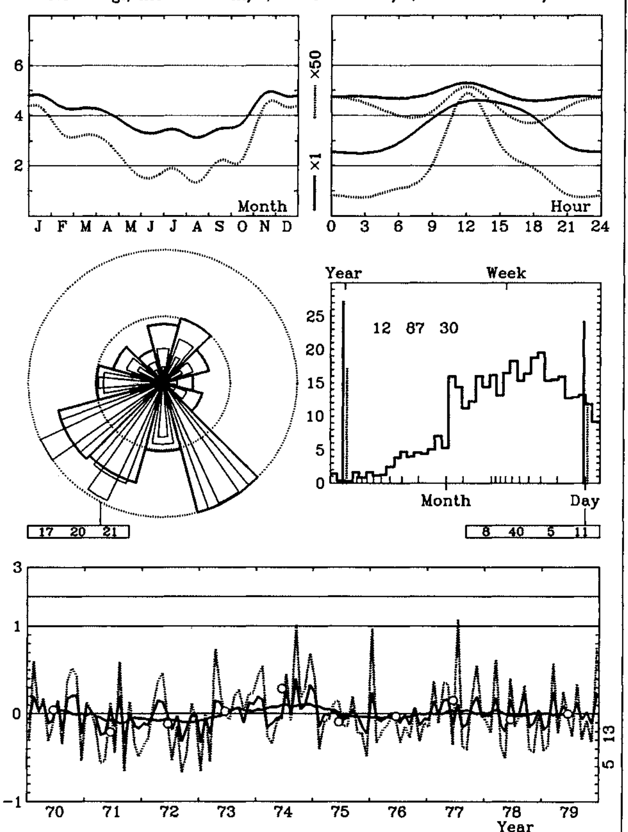
Bremen, Germany (FRG) 1970–79

10.0 m agl, mean 4.3 m/s, st dev 2.5 m/s, cube 170. m^3/s^3



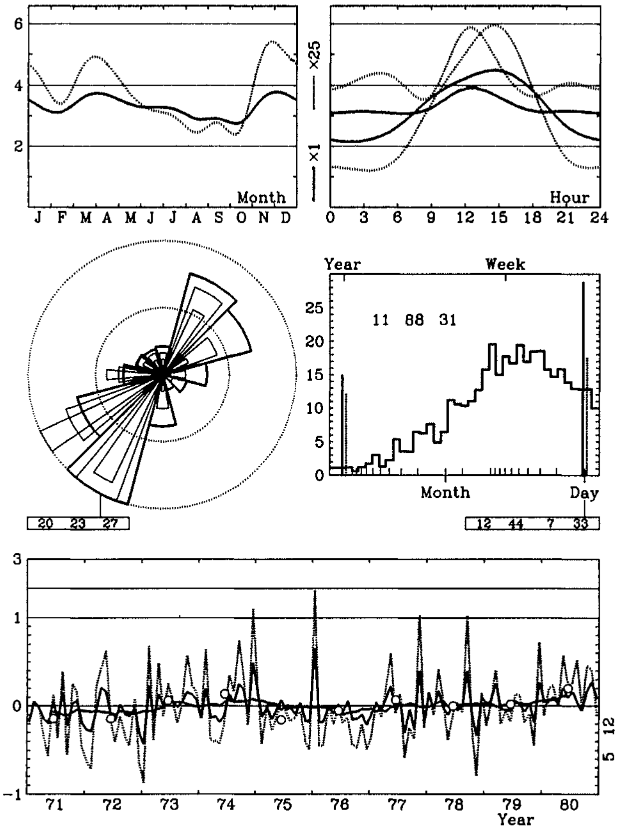
Düsseldorf, Germany (FRG) 1970–79

10.0 m agl, mean 4.0 m/s, st dev 2.4 m/s, cube 140. m^3/s^3



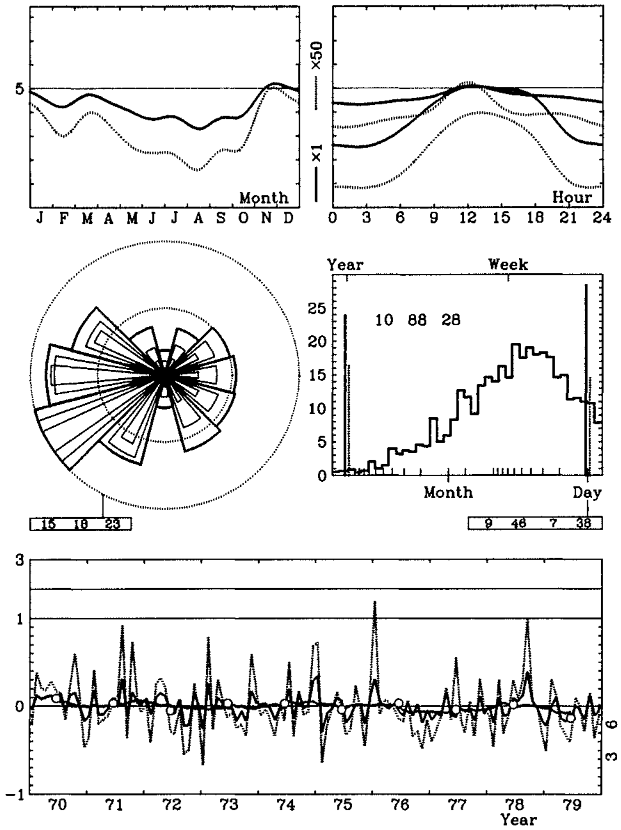
Frankfurt, Germany (FRG) 1971–80

10.0 m agl, mean 3.3 m/s, st dev 2.2 m/s, cube 94. m^3/s^3



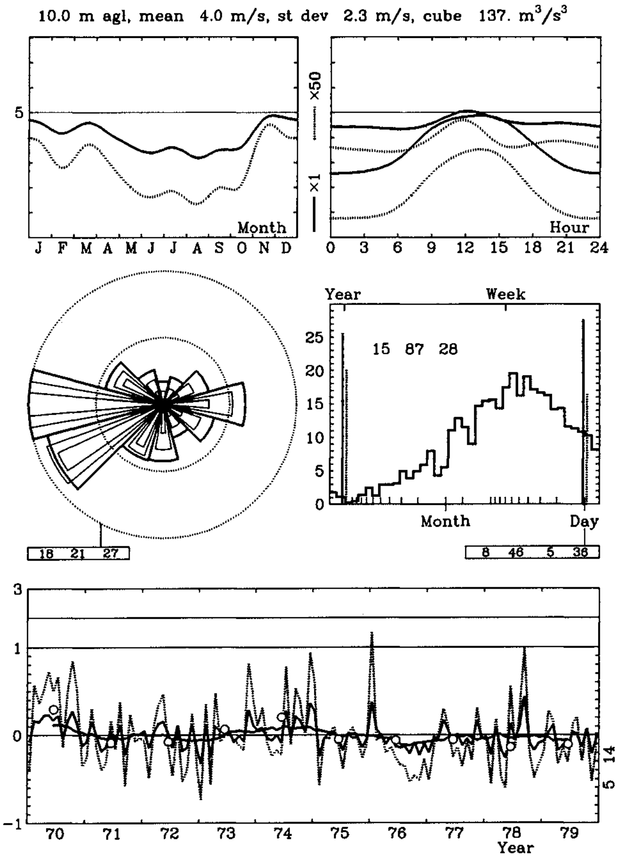
Hamburg, Germany (FRG) 1970–79

10.0 m agl, mean 4.2 m/s, st dev 2.4 m/s, cube 156. m^3/s^3



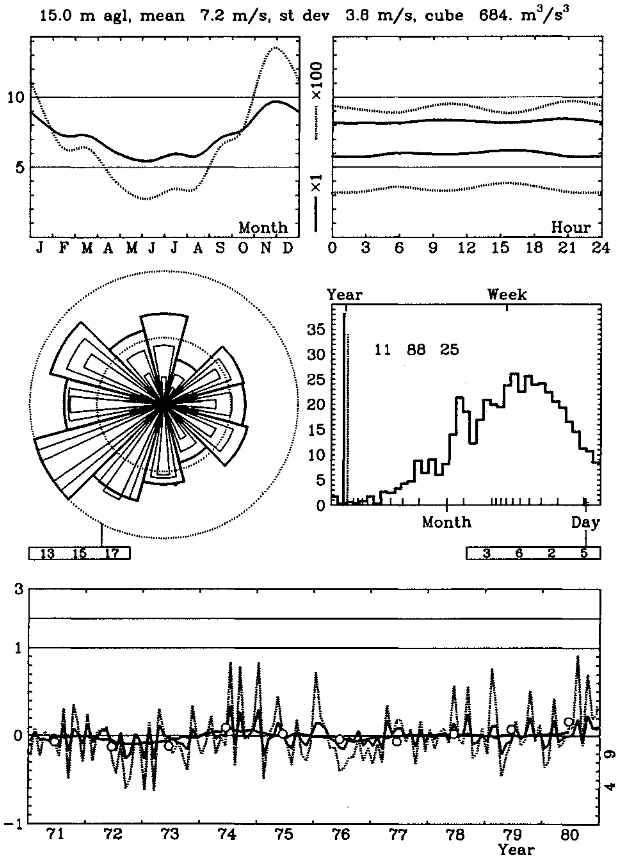
Hannover, Germany (FRG) 1970–79

10.0 m agl, mean 4.0 m/s, st dev 2.3 m/s, cube 137. m^3/s^3



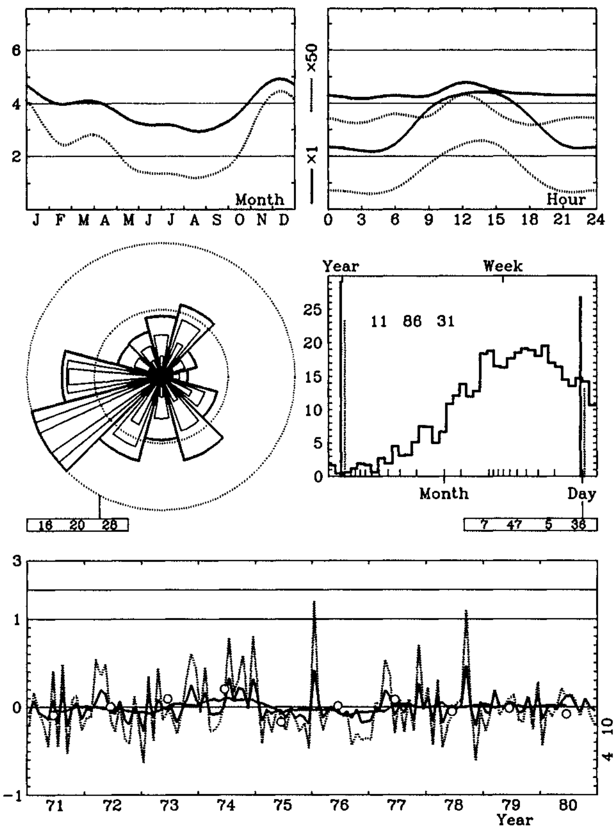
Helgoland, Germany (FRG) 1971–80

15.0 m agl, mean 7.2 m/s, st dev 3.8 m/s, cube 684. m^3/s^3



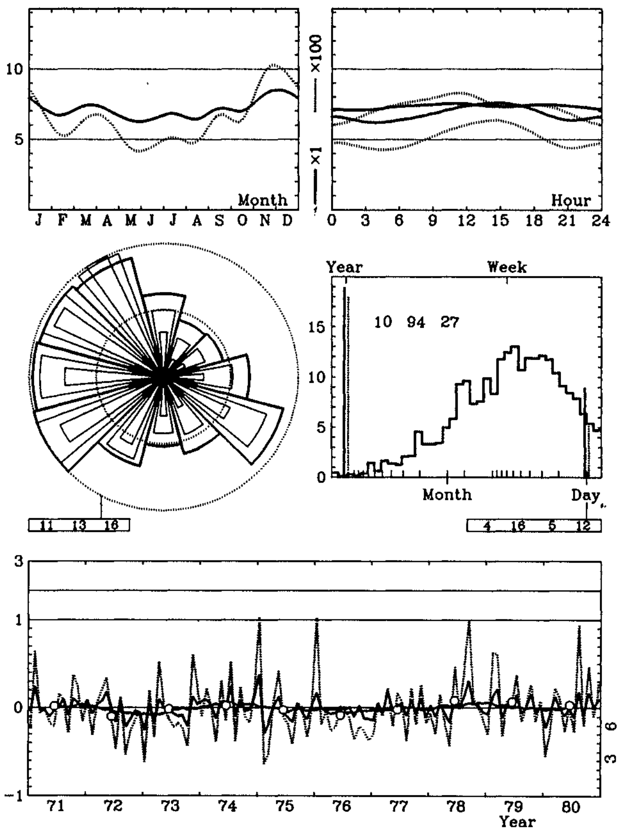
Hof–Hohensaas, Germany (FRG) 1971–80

15.0 m agl, mean 3.8 m/s, st dev 2.2 m/s, cube 120. m^3/s^3



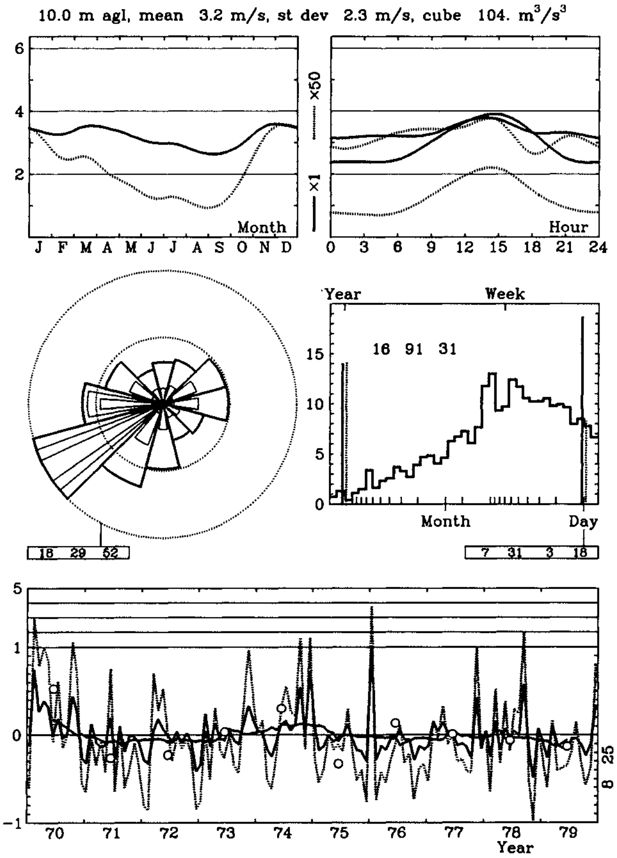
List/Sylt, Germany (FRG) 1971–80

12.0 m agl, mean 7.1 m/s, st dev 3.5 m/s, cube 641. m^3/s^3



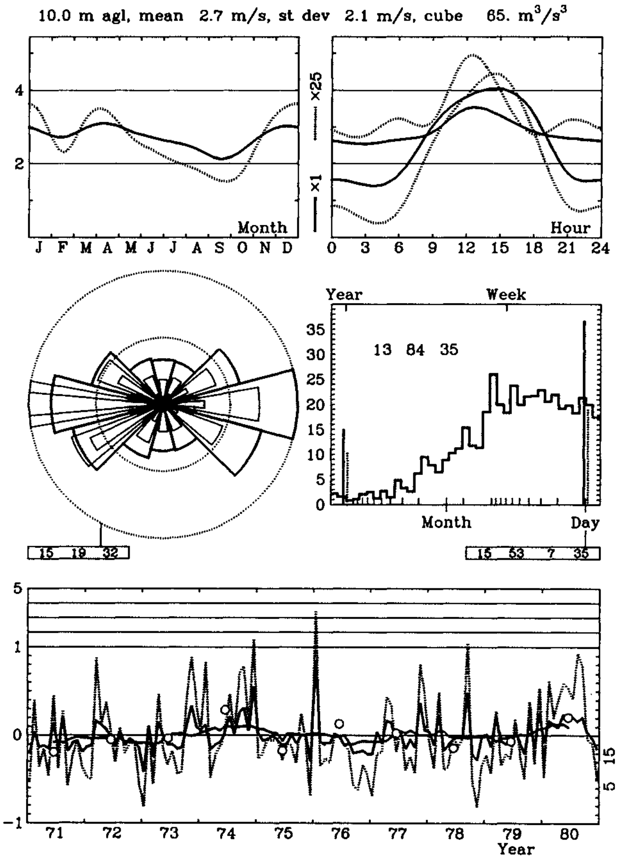
München, Germany (FRG) 1970–79

10.0 m agl, mean 3.2 m/s, st dev 2.3 m/s, cube 104. m^3/s^3



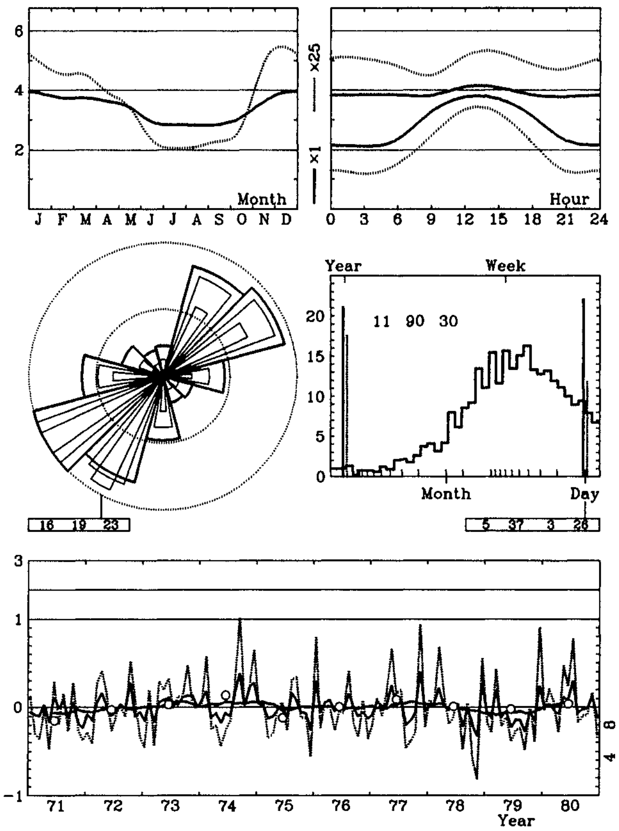
Nürnberg, Germany (FRG) 1971–80

10.0 m agl, mean 2.7 m/s, st dev 2.1 m/s, cube 65. m^3/s^3



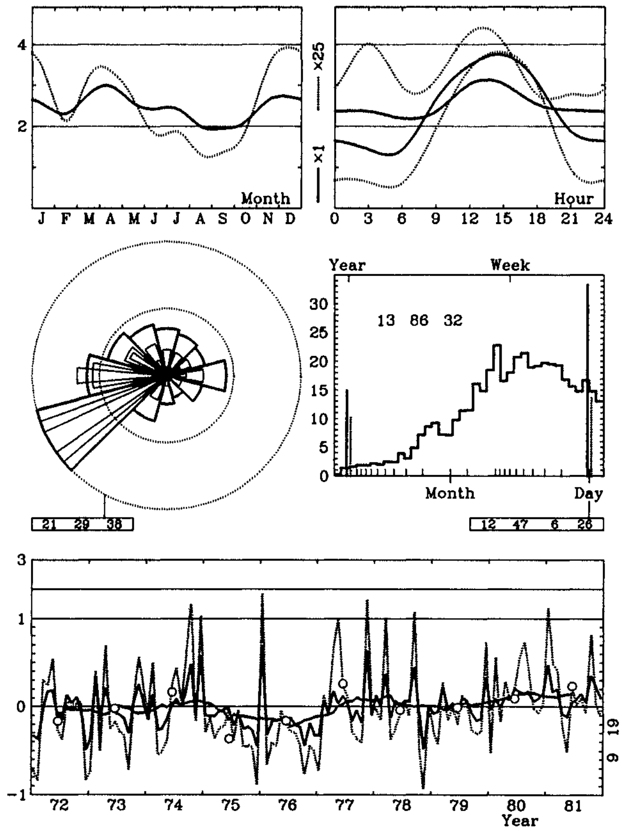
Saarbrücken, Germany (FRG) 1971–80

10.0 m agl, mean 3.4 m/s, st dev 2.1 m/s, cube 90. m^3/s^3



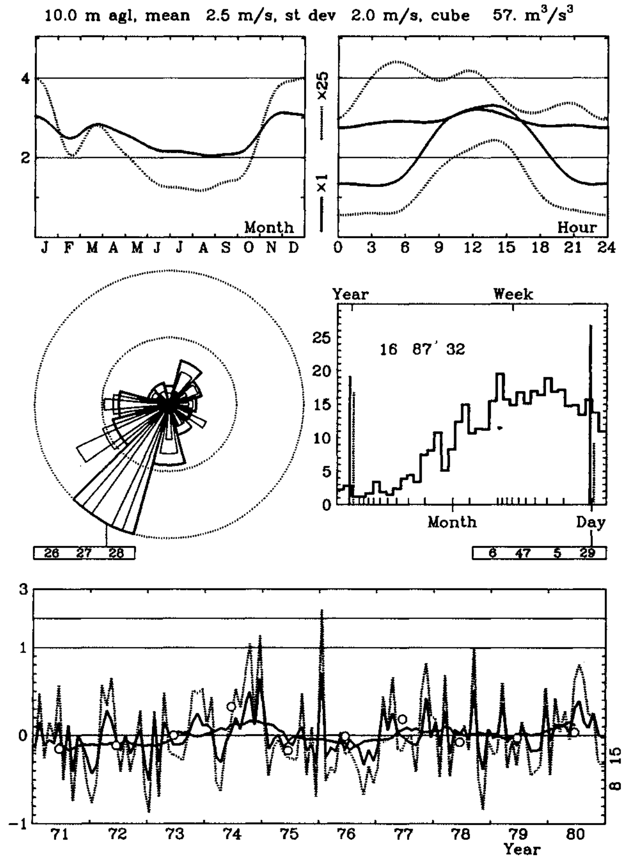
Stuttgart, Germany (FRG) 1972–81

10.0 m agl, mean 2.5 m/s, st dev 2.2 m/s, cube 63. m^3/s^3



Weissenburg, Germany (FRG) 1971–80

10.0 m agl, mean 2.5 m/s, st dev 2.0 m/s, cube 57. m^3/s^3



Araxos

38° 13′ 12″ N 21° 22′ 15″ E	UTM 34 E 532462 m N 4230360 m	15 m a.s.l.

Located at the northwestern corner of Peloponnesus. The station lies near the coast of the Bay of Patras and 30 km westsouthwest of the city of Patras. There are no mountains within 20 km. To the northwest there are hills with heights of up to 200 m at a distance of 2 to 5 km. The distance to the sea is 5 km to the west and north.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	500	0.10	5000	0.00								5
30	0.03	550	0.10	6000	0.00							8	3
60	0.03	600	0.10	6000	0.00							8	-2
90	0.03	400	0.10	8000	0.00							1	-5
120	0.03	400	0.10	5000	0.20							-8	-3
150	0.03	600	0.10	5000	0.20							-8	3
180	0.03	800	0.10	5000	0.20								5
210	0.02	300	0.40	500	0.10							8	3
240	0.01	200	0.40	350	0.10	2200	0.30	4500	0.00			8	-2
270	0.03	180	0.40	350	0.10	2000	0.20	5000	0.00			1	-5
300	0.03	220	0.40	350	0.10	6000	0.00					-8	-3
330	0.03	300	0.40	450	0.10	4500	0.002	8000	0.00			-8	3

Height of anemometer: 2.5 m a.g.l. Period: 74010100-75010100

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.3	713	0	19	65	48	71	42	26	10	6	0	0	0	0	1.4	0.77
30	5.9	642	0	9	49	49	70	44	70	26	32	6	0	3	0	2.5	0.92
60	20.5	185	3	12	47	69	127	133	171	68	101	68	5	3	10	7.5	2.41
90	11.4	332	5	20	108	148	155	75	66	27	44	19	2	0	0	5.1	1.87
120	4.5	846	0	0	31	23	42	15	31	8	4	0	0	0	0	0.4	0.50
150	4.5	835	0	8	19	42	42	38	8	0	4	0	0	4	0	0.4	0.51
180	8.0	470	2	15	79	96	104	66	68	23	51	24	2	0	0	4.3	1.38
210	4.9	765	0	7	45	42	52	35	31	14	3	6	0	0	0	1.0	0.65
240	9.0	422	2	17	98	128	151	71	61	13	31	6	0	0	0	4.4	1.69
270	15.4	245	0	26	118	213	217	102	48	22	7	2	0	0	0	5.1	2.95
300	5.6	679	0	3	58	64	74	64	28	15	9	6	0	0	0	1.9	0.85
330	5.0	760	0	27	52	52	69	17	14	3	6	0	0	0	0	0.9	0.67
Total	100.0	454	2	15	72	100	121	76	72	27	37	20	1	1	2	4.5	1.46

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-
Day	-	-	-	-	-	-	-	-	-	-	-	-	-

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	3.9	11.9	10.5	6.3	2.4	7.5	3.5	6.4	8.9	7.4	2.7	7.4
	0.77	0.90	2.28	1.94	1.18	0.69	1.31	0.87	1.58	2.66	1.61	0.78	1.36
25	2.7	4.3	13.0	11.4	6.9	2.7	8.2	3.9	7.0	9.8	8.1	3.0	8.1
	0.78	0.92	2.31	1.96	1.19	0.69	1.33	0.88	1.62	2.75	1.64	0.80	1.38
50	3.0	4.6	13.8	12.2	7.4	2.8	8.7	4.2	7.6	10.5	8.7	3.2	8.7
	0.80	0.94	2.35	2.00	1.21	0.69	1.35	0.90	1.67	2.82	1.69	0.81	1.40
100	3.2	4.9	14.7	13.0	7.9	3.0	9.3	4.4	8.2	11.4	9.4	3.4	9.3
	0.78	0.92	2.34	1.99	1.21	0.70	1.34	0.89	1.62	2.73	1.65	0.80	1.40
200	3.3	5.2	15.8	13.9	8.4	3.2	9.9	4.7	9.0	12.6	10.2	3.7	10.0
	0.76	0.90	2.29	1.94	1.18	0.69	1.32	0.88	1.53	2.58	1.58	0.78	1.37
Freq	5.5	5.3	15.7	13.2	7.1	5.7	7.3	4.9	7.2	13.1	8.9	6.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	4.0	8.6	7.0	2.4	1.8	5.7	1.7	4.8	6.3	4.1	1.3	5.1
	0.72	1.02	2.13	1.65	0.76	0.67	1.29	0.75	1.48	2.25	1.09	0.63	1.23
25	2.2	4.8	10.1	8.3	2.9	2.1	6.7	2.1	5.7	7.5	4.9	1.5	6.1
	0.74	1.05	2.19	1.71	0.77	0.68	1.33	0.77	1.60	2.43	1.13	0.65	1.27
50	2.6	5.4	11.3	9.3	3.2	2.4	7.6	2.5	6.7	8.6	5.7	1.8	6.9
	0.79	1.10	2.28	1.79	0.79	0.69	1.38	0.81	1.79	2.72	1.21	0.69	1.33
100	3.1	6.3	12.7	10.5	3.7	2.7	8.6	2.9	8.0	10.2	6.6	2.2	8.0
	0.83	1.17	2.44	1.92	0.82	0.71	1.47	0.86	1.91	2.90	1.29	0.73	1.40
200	3.5	7.2	14.5	12.1	4.1	3.0	9.7	3.3	9.9	12.7	7.7	2.5	9.3
	0.81	1.14	2.37	1.87	0.82	0.71	1.44	0.84	1.83	2.77	1.25	0.71	1.39
Freq	5.4	5.9	17.5	12.0	6.1	5.7	7.4	4.5	8.0	14.0	7.7	5.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	4.6	7.4	6.0	2.0	1.9	4.8	2.0	4.3	5.4	3.4	1.1	4.5
	0.73	1.24	2.11	1.63	0.75	0.73	1.27	0.85	1.57	2.17	1.04	0.64	1.24
25	2.0	5.6	9.0	7.3	2.5	2.3	5.9	2.5	5.4	6.7	4.2	1.4	5.5
	0.75	1.27	2.16	1.67	0.76	0.74	1.30	0.88	1.68	2.31	1.08	0.66	1.28
50	2.4	6.5	10.3	8.4	2.9	2.7	6.7	2.9	6.4	7.8	4.9	1.7	6.3
	0.79	1.32	2.24	1.74	0.78	0.75	1.35	0.94	1.85	2.55	1.14	0.69	1.33
100	2.9	7.5	11.7	9.6	3.3	3.1	7.7	3.5	7.6	9.2	5.8	2.1	7.4
	0.85	1.43	2.38	1.88	0.81	0.77	1.43	1.01	2.04	2.81	1.24	0.74	1.42
200	3.4	8.6	13.4	11.1	3.8	3.5	8.8	4.1	9.4	11.4	6.8	2.4	8.7
	0.83	1.40	2.36	1.85	0.81	0.78	1.42	0.98	1.95	2.69	1.21	0.72	1.41
Freq	5.3	6.9	17.0	11.5	6.0	5.9	7.2	4.8	8.6	13.5	7.5	5.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.4	4.4	5.7	4.6	1.5	1.9	3.6	2.0	3.6	4.2	2.5	0.9	3.5
	0.74	1.50	2.06	1.56	0.74	0.81	1.23	1.01	1.69	2.03	0.99	0.65	1.26
25	1.8	5.7	7.4	5.9	2.0	2.5	4.7	2.7	4.8	5.5	3.2	1.2	4.6
	0.76	1.54	2.10	1.60	0.74	0.82	1.25	1.05	1.79	2.14	1.02	0.67	1.29
50	2.2	6.8	8.8	7.1	2.4	2.9	5.5	3.3	5.8	6.6	3.9	1.5	5.5
	0.80	1.59	2.17	1.65	0.76	0.83	1.28	1.12	1.95	2.31	1.06	0.69	1.33
100	2.7	8.0	10.2	8.3	2.8	3.5	6.5	4.0	7.0	7.9	4.7	1.9	6.6
	0.85	1.69	2.28	1.75	0.77	0.86	1.35	1.24	2.22	2.63	1.14	0.74	1.41
200	3.2	9.3	11.9	9.7	3.3	4.0	7.6	4.8	8.6	9.6	5.6	2.2	7.8
	0.85	1.71	2.33	1.78	0.80	0.88	1.37	1.21	2.14	2.54	1.15	0.74	1.44
Freq	5.3	8.3	16.5	10.8	6.0	6.1	6.8	5.3	9.3	12.7	7.3	5.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.8	609	4.8	252	4.2	165	3.3	80
25	7.4	774	5.6	390	5.1	283	4.3	168
50	7.9	915	6.4	520	5.8	401	5.1	265
100	8.5	1130	7.3	704	6.7	556	6.0	393
200	9.2	1469	8.5	1147	7.9	900	7.1	626

Athina

37° 54′ 00″ N 23° 44′ 00″ E	UTM 34 E 740338 m N 4198312 m	28 m a.s.l.

Located close to the runways of the airport of Athens. The terrain is flat and there are no buildings and trees within 100 m of the station, except in the direction WSW where some one- and two-storeyed buildings occur at a distance of 70 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.30									1	-4
30	0.01	1200	0.30									-8	-6
60	0.01	1300	0.30	4000	0.10	6000	0.03					-16	-2
90	0.01	1000	0.30	5000	0.05							-13	5
120	0.01	1500	0.10	3500	0.05							-3	5
150	0.01	750	0.10									3	2
180	0.01	350	0.05	1500	0.00							1	-3
210	0.01	200	0.10	500	0.00							-6	-4
240	0.01	200	0.10	400	0.00							-12	-1
270	0.01	200	0.10	600	0.00							-10	3
300	0.01	200	0.10	750	0.00							-2	4
330	0.01	250	0.10	5000	0.03	6500	0.30					3	2

Height of anemometer: 10.0 m a.g.l. Period: 74010100-83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	17.1	125	75	167	146	121	95	70	74	49	56	15	5	0	0	4.9	1.63
30	14.1	146	61	97	90	90	87	92	100	87	108	26	10	4	0	6.3	1.94
60	8.8	217	101	121	96	93	80	68	78	63	68	8	5	1	1	4.8	1.52
90	7.0	279	88	104	76	79	89	82	80	60	51	7	3	0	1	4.6	1.51
120	4.0	474	112	121	88	62	39	35	29	13	20	6	1	0	0	2.4	1.00
150	5.9	341	83	155	113	92	65	41	46	27	28	7	2	0	0	3.4	1.24
180	9.1	219	62	133	145	135	115	69	41	30	39	8	4	1	0	4.5	1.63
210	7.5	261	60	147	151	132	97	53	38	21	28	7	3	0	0	4.1	1.55
240	5.3	351	95	187	171	88	45	21	15	10	15	2	1	1	0	3.0	1.35
270	6.3	324	90	201	172	95	51	15	21	12	11	5	3	0	0	3.2	1.37
300	6.5	321	73	143	115	96	59	59	44	33	45	8	3	1	0	3.8	1.28
330	8.4	255	76	138	117	98	83	68	57	41	51	10	4	0	1	4.3	1.42
Total	100.0	240	78	141	123	102	81	62	59	44	51	11	4	1	0	4.4	1.43

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.6	3.6	2.5	2.1	1.7	1.8	2.2	2.3	2.3	2.7	3.0	3.5	2.6
3	3.8	3.8	2.7	1.9	1.8	1.7	2.2	2.4	2.3	2.6	3.1	3.6	2.7
6	3.7	3.9	2.9	2.4	2.4	2.6	3.3	3.3	2.7	2.9	3.1	3.8	3.1
9	4.4	4.9	4.3	4.0	3.9	4.1	5.0	5.4	5.0	4.4	4.4	4.5	4.5
12	5.0	5.5	4.9	4.7	5.0	4.9	5.4	5.7	5.3	4.9	4.7	5.1	5.1
15	4.8	5.3	5.2	5.0	5.0	5.2	6.0	6.2	5.7	5.1	4.5	4.6	5.2
18	4.3	4.5	3.8	3.7	3.2	3.7	4.5	4.6	4.0	3.8	4.0	4.0	4.0
21	3.7	3.9	3.0	2.5	2.2	2.1	2.4	2.7	2.4	3.1	3.3	3.5	2.9
Day	4.2	4.4	3.7	3.3	3.2	3.2	3.9	4.1	3.7	3.7	3.8	4.1	3.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	9.2	8.7	7.7	4.7	4.8	5.2	5.2	4.3	4.2	4.6	6.5	6.5
	1.88	1.96	1.83	1.67	1.25	1.43	1.57	1.57	1.38	1.33	1.28	1.62	1.51
25	8.1	10.1	9.5	8.4	5.2	5.2	5.7	5.7	4.7	4.7	5.1	7.1	7.2
	1.93	1.99	1.86	1.70	1.28	1.48	1.62	1.62	1.42	1.37	1.32	1.66	1.54
50	8.7	10.8	10.1	9.0	5.6	5.6	6.1	6.1	5.1	5.0	5.5	7.7	7.7
	1.98	2.05	1.91	1.74	1.31	1.51	1.66	1.66	1.46	1.40	1.36	1.71	1.57
100	9.4	11.5	10.9	9.6	6.0	6.1	6.6	6.6	5.5	5.4	5.9	8.3	8.3
	1.93	2.01	1.88	1.71	1.27	1.47	1.61	1.61	1.42	1.36	1.31	1.66	1.55
200	10.3	12.4	11.7	10.4	6.5	6.7	7.3	7.3	6.0	5.9	6.5	9.1	9.0
	1.83	1.95	1.82	1.65	1.22	1.39	1.52	1.52	1.34	1.29	1.25	1.58	1.51
Freq	13.1	15.0	11.8	8.1	4.7	4.9	7.5	7.9	6.5	6.8	6.6	7.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	6.8	5.9	5.1	2.6	3.4	3.6	3.5	2.7	2.9	3.2	4.7	4.5
	1.61	1.82	1.57	1.41	1.05	1.27	1.36	1.30	1.15	1.12	1.10	1.43	1.34
25	6.2	8.1	7.0	6.1	3.2	4.1	4.3	4.2	3.3	3.5	4.0	5.7	5.4
	1.72	1.90	1.64	1.48	1.13	1.37	1.47	1.40	1.23	1.21	1.18	1.52	1.41
50	7.2	9.1	7.9	6.9	3.8	4.8	5.1	5.0	3.9	4.2	4.7	6.5	6.3
	1.90	2.01	1.74	1.59	1.26	1.53	1.65	1.57	1.38	1.35	1.32	1.68	1.52
100	8.5	10.4	9.1	8.0	4.6	5.8	6.1	5.9	4.7	5.0	5.6	7.7	7.4
	2.03	2.16	1.88	1.71	1.34	1.63	1.75	1.67	1.46	1.43	1.40	1.79	1.62
200	10.4	12.1	10.7	9.5	5.6	7.1	7.5	7.3	5.8	6.2	6.9	9.4	8.9
	1.95	2.09	1.81	1.65	1.28	1.56	1.67	1.60	1.40	1.37	1.34	1.72	1.60
Freq	14.4	14.9	10.9	7.3	4.1	5.3	8.1	7.8	6.3	6.9	6.5	7.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	5.9	5.1	4.3	2.4	3.1	3.1	3.0	2.4	2.5	2.9	4.2	3.9
	1.62	1.81	1.57	1.38	1.08	1.33	1.35	1.28	1.15	1.12	1.10	1.46	1.34
25	5.7	7.2	6.2	5.3	3.0	3.8	3.9	3.7	3.0	3.2	3.6	5.2	4.9
	1.71	1.88	1.63	1.44	1.15	1.42	1.45	1.37	1.23	1.20	1.18	1.55	1.40
50	6.7	8.3	7.2	6.2	3.6	4.5	4.6	4.4	3.6	3.8	4.4	6.1	5.7
	1.86	1.98	1.73	1.54	1.27	1.57	1.60	1.51	1.35	1.32	1.29	1.69	1.50
100	7.9	9.5	8.4	7.2	4.3	5.4	5.6	5.3	4.4	4.6	5.3	7.2	6.8
	2.04	2.16	1.89	1.68	1.39	1.73	1.75	1.65	1.48	1.44	1.42	1.85	1.63
200	9.6	11.1	9.9	8.6	5.3	6.7	6.8	6.6	5.3	5.7	6.5	8.7	8.1
	1.96	2.10	1.83	1.63	1.33	1.65	1.68	1.58	1.41	1.38	1.36	1.78	1.61
Freq	14.4	14.6	10.6	7.0	4.2	5.5	8.0	7.7	6.3	6.9	6.5	8.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.6	4.0	3.3	1.9	2.5	2.5	2.3	1.9	2.0	2.4	3.3	3.1
	1.64	1.79	1.57	1.34	1.10	1.39	1.36	1.27	1.12	1.11	1.12	1.49	1.35
25	5.0	6.0	5.2	4.3	2.6	3.3	3.3	3.1	2.5	2.7	3.2	4.3	4.1
	1.71	1.85	1.62	1.40	1.16	1.48	1.44	1.35	1.19	1.17	1.18	1.57	1.40
50	6.0	7.1	6.2	5.2	3.2	4.0	4.0	3.7	3.1	3.3	3.9	5.3	4.9
	1.82	1.93	1.70	1.47	1.25	1.60	1.56	1.46	1.28	1.26	1.28	1.69	1.48
100	7.1	8.4	7.4	6.2	3.9	4.9	4.9	4.6	3.8	4.1	4.8	6.4	5.9
	2.03	2.08	1.85	1.62	1.42	1.82	1.77	1.65	1.46	1.43	1.45	1.91	1.62
200	8.6	9.8	8.7	7.3	4.7	5.9	5.9	5.6	4.6	4.9	5.8	7.7	7.1
	1.99	2.09	1.85	1.60	1.37	1.75	1.71	1.60	1.40	1.38	1.40	1.85	1.62
Freq	14.4	14.1	10.1	6.6	4.3	5.9	8.0	7.5	6.4	6.8	6.6	9.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.9	340	4.2	144	3.6	94	2.8	45
25	6.5	431	4.9	221	4.4	161	3.7	95
50	6.9	512	5.6	295	5.2	228	4.5	151
100	7.4	655	6.6	425	6.1	328	5.3	225
200	8.1	892	8.0	766	7.3	586	6.4	391

Heraklion

35° 20′ 00″ N 25° 08′ 00″ E	UTM 35 E 330339 m N 3911670 m	37 m a.s.l.

Located at the airport of Heraklion on the N coast of the island of Crete. The terrain is flat and slopes down to the coastline, which is found at a distance of about 300 m to the N. The terrain is entirely open for several hundreds of metres to the W, N and E. In the sector from E–SE several buildings shelter the anemometer. The anemometer is located 6 m above the roof of a 4-m high building which has a base of 16 × 5 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	650	0.00									-9	-2
30	0.04	700	0.00									-8	3
60	0.03	500	0.00									-1	4
90	0.03	900	0.00									5	2
120	0.03	1000	0.02	3000	0.20							5	-3
150	0.03	500	0.10	3000	0.20							-3	-6
180	0.03	300	0.06	1500	0.20							-12	-3
210	0.03	300	0.06	1300	0.20							-11	4
240	0.03	300	0.06	1400	0.20							-1	6
270	0.03	1500	0.30	5000	0.10							6	2
300	0.03	1500	0.00									5	-2
330	0.03	800	0.00									-3	-4

Height of anemometer: 10.0 m a.g.l. Period: 74010100–83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	13.9	62	91	223	128	104	87	65	77	39	59	31	18	10	7	5.3	1.36
30	4.5	173	171	309	140	83	52	21	23	11	11	4	2	0	0	3.0	1.29
60	2.6	312	138	229	129	78	44	28	19	4	11	4	4	0	0	2.9	1.26
90	1.5	506	128	163	79	42	27	20	18	2	11	0	4	0	0	2.0	0.98
120	2.4	306	97	229	117	59	53	32	44	7	38	6	10	3	0	3.0	1.05
150	12.2	64	116	298	138	73	58	39	44	24	61	35	23	12	14	4.3	1.03
180	17.8	51	168	344	120	54	33	30	42	22	51	34	23	15	14	3.5	0.91
210	5.5	144	173	292	107	42	46	24	46	24	56	22	13	7	3	3.2	0.95
240	2.7	275	108	290	104	68	52	26	28	11	25	6	2	4	0	2.9	1.08
270	3.8	235	57	146	105	85	79	66	83	52	59	19	10	3	2	4.8	1.43
300	13.7	53	27	71	92	110	129	108	145	84	113	48	14	4	1	7.2	2.36
330	19.5	39	25	88	98	124	116	117	134	62	105	50	23	8	9	7.3	2.03
Total	100.0	95	95	212	114	87	77	64	79	40	69	33	17	8	7	5.3	1.35

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.2	5.6	4.7	3.9	3.0	3.1	3.7	3.9	3.7	3.8	5.0	5.3	4.2
3	5.6	5.7	5.1	4.1	3.1	3.3	4.0	4.4	4.0	4.0	5.2	5.4	4.5
6	5.6	5.7	5.2	4.2	3.1	3.1	4.3	5.0	4.2	3.9	5.1	5.3	4.6
9	5.6	6.2	6.0	5.5	4.8	5.0	6.1	6.5	5.7	4.9	5.4	5.4	5.6
12	6.3	6.8	6.7	6.1	5.2	5.4	6.4	6.9	6.0	5.3	5.9	6.1	6.1
15	5.8	6.3	6.0	5.3	4.4	4.6	5.7	6.0	5.3	4.7	5.0	5.5	5.4
18	5.2	5.5	5.1	3.5	2.7	2.9	3.9	4.2	3.7	3.7	4.8	5.3	4.2
21	5.2	5.8	4.8	3.6	2.7	2.8	3.6	3.9	3.4	3.9	4.8	5.4	4.2
Day	5.6	6.0	5.5	4.5	3.6	3.8	4.7	5.1	4.5	4.3	5.2	5.5	4.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.3	4.7	3.4	2.5	4.3	6.7	6.5	5.7	5.1	6.8	8.2	8.6	6.8
	1.55	1.17	1.28	1.05	1.23	1.07	0.95	0.95	1.10	1.57	2.29	2.07	1.21
25	8.0	5.2	3.8	2.7	4.8	7.3	7.0	6.2	5.6	7.4	9.0	9.4	7.4
	1.58	1.21	1.32	1.08	1.26	1.08	0.96	0.95	1.11	1.60	2.36	2.12	1.23
50	8.6	5.6	4.1	3.0	5.2	7.8	7.5	6.6	6.0	8.0	9.6	10.1	7.9
	1.62	1.24	1.35	1.11	1.29	1.09	0.97	0.96	1.13	1.65	2.42	2.18	1.25
100	9.3	6.0	4.4	3.2	5.6	8.3	7.9	7.0	6.4	8.6	10.5	10.9	8.5
	1.59	1.20	1.31	1.08	1.25	1.09	0.97	0.97	1.12	1.61	2.35	2.12	1.26
200	10.0	6.6	4.8	3.5	6.1	8.8	8.4	7.4	6.8	9.3	11.6	11.9	9.2
	1.53	1.14	1.24	1.02	1.19	1.08	0.96	0.96	1.09	1.54	2.22	2.03	1.24
Freq	16.4	6.7	2.9	1.5	1.9	9.1	17.8	8.6	3.4	3.2	10.7	17.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	2.6	2.1	1.5	3.3	4.8	4.6	3.9	3.7	5.2	5.7	5.9	4.7
	1.26	1.13	1.06	0.82	1.01	1.01	0.92	0.94	1.13	1.59	1.94	1.73	1.13
25	5.7	3.2	2.6	1.9	4.0	5.6	5.3	4.6	4.5	6.3	6.9	7.1	5.6
	1.32	1.21	1.13	0.88	1.04	1.02	0.92	0.96	1.19	1.70	2.10	1.83	1.16
50	6.5	3.8	3.1	2.3	4.6	6.3	6.0	5.2	5.2	7.2	7.9	8.1	6.5
	1.42	1.35	1.27	0.98	1.11	1.05	0.94	0.98	1.29	1.87	2.36	2.01	1.22
100	7.6	4.5	3.7	2.8	5.4	7.1	6.7	5.9	6.1	8.5	9.4	9.5	7.5
	1.52	1.44	1.35	1.03	1.19	1.09	0.96	1.03	1.38	2.00	2.51	2.15	1.30
200	9.0	5.6	4.6	3.4	6.3	7.9	7.4	6.6	7.3	10.3	11.7	11.5	8.9
	1.47	1.38	1.29	0.99	1.15	1.09	0.97	1.02	1.33	1.92	2.40	2.07	1.32
Freq	15.3	4.6	2.4	1.3	2.5	11.1	19.1	5.7	2.8	3.9	12.6	18.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	2.3	1.8	1.4	3.2	4.1	4.0	3.4	3.2	4.8	5.0	5.1	4.1
	1.24	1.17	1.02	0.82	0.99	1.00	0.93	0.95	1.12	1.76	1.92	1.69	1.13
25	5.0	3.0	2.3	1.8	3.9	5.0	4.9	4.2	4.0	5.9	6.2	6.3	5.1
	1.29	1.25	1.08	0.87	1.01	1.01	0.94	0.96	1.17	1.88	2.06	1.78	1.17
50	5.9	3.5	2.7	2.3	4.5	5.7	5.5	4.8	4.7	6.9	7.3	7.3	5.9
	1.38	1.38	1.19	0.95	1.04	1.03	0.94	0.99	1.25	2.06	2.28	1.93	1.22
100	6.9	4.3	3.3	2.8	5.3	6.5	6.3	5.5	5.6	8.2	8.6	8.6	6.9
	1.51	1.51	1.30	1.04	1.12	1.06	0.96	1.02	1.36	2.26	2.50	2.12	1.29
200	8.2	5.2	4.0	3.4	6.0	7.3	7.1	6.2	6.6	10.1	10.7	10.4	8.2
	1.46	1.45	1.25	0.99	1.10	1.08	0.98	1.03	1.32	2.17	2.39	2.04	1.33
Freq	14.3	4.4	2.3	1.4	3.2	11.8	17.9	5.5	2.9	4.7	13.1	18.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	1.7	1.4	1.3	2.7	3.2	3.2	2.7	2.8	3.9	4.0	3.9	3.3
	1.23	1.08	1.02	0.84	0.98	0.99	0.94	0.97	1.21	1.94	1.88	1.64	1.15
25	4.1	2.3	1.9	1.7	3.5	4.2	4.2	3.6	3.7	5.2	5.2	5.2	4.3
	1.28	1.15	1.08	0.88	1.00	1.01	0.95	0.98	1.27	2.06	1.99	1.72	1.18
50	5.0	2.8	2.3	2.2	4.1	4.9	4.9	4.2	4.4	6.2	6.3	6.2	5.2
	1.36	1.24	1.17	0.95	1.02	1.02	0.96	1.00	1.35	2.23	2.17	1.83	1.22
100	6.0	3.5	2.9	2.8	4.8	5.8	5.7	5.0	5.3	7.5	7.6	7.4	6.2
	1.49	1.40	1.32	1.07	1.06	1.04	0.98	1.04	1.49	2.54	2.47	2.05	1.29
200	7.2	4.2	3.5	3.3	5.7	6.6	6.6	5.8	6.4	9.2	9.3	8.9	7.4
	1.48	1.35	1.27	1.03	1.09	1.07	1.00	1.06	1.47	2.45	2.38	2.01	1.34
Freq	13.0	4.1	2.1	1.5	4.3	12.9	16.2	5.1	2.9	5.7	14.0	18.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	613	4.5	258	3.9	169	3.1	81
25	6.9	775	5.3	397	4.8	286	4.1	169
50	7.4	916	6.1	524	5.5	405	4.8	268
100	7.9	1116	6.9	704	6.4	560	5.7	393
200	8.6	1447	8.2	1118	7.6	882	6.8	617

Kerkyra

39° 37′ 00″ N 19° 55′ 00″ E	UTM 34	E 407006 m	N 4385847 m	2 m a.s.l.

Location in an airport, 3 km from the city of Kerkyra on the island of Kerkyra (Corfu). The terrain is flat and uniform within 500 m. The distance to the shoreline is 1200 m to the E. The ground rises gently from the coast to some 120-m high hills, which are found 3 km to the NW of the station. There is a 12-m high and 35-m wide obstacle 120 m to the N.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	600	0.20	1500	0.30	2300	0.00					-1	
30	0.03	200	0.20	1000	0.10	2500	0.00					-2	-1
60	0.03	200	0.30	1000	0.25	1300	0.00					-3	-1
90	0.03	200	0.30	1200	0.00							-4	
120	0.01	400	0.20	1350	0.00							-3	1
150	0.001	450	0.003	600	0.03	900	0.20	1200	0.00			-2	1
180	0.001	500	0.004	1000	0.01	2000	0.09					-2	
210	0.01	500	0.00	1500	0.03	2500	0.10					-2	-1
240	0.03	150	0.00	1000	0.03	1300	0.15					-4	-1
270	0.03	300	0.00	800	0.10							-5	
300	0.03	700	0.20	1500	0.10							-4	1
330	0.03	800	0.30	2500	0.04	2900	0.01	3500	0.003	4500	0.00	-3	1

Height of anemometer: 4.0 m a.g.l. Period: 74010100–83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.5	455	13	92	83	80	64	55	82	41	33	2	1	0	0	3.6	1.26
30	6.1	725	13	96	52	37	32	16	19	5	4	1	1	0	0	1.0	0.71
60	5.7	769	17	104	60	24	10	4	8	2	2	0	0	0	0	0.6	0.65
90	6.7	667	27	150	63	26	18	13	16	12	6	1	1	0	0	1.3	0.80
120	9.7	436	18	147	109	80	58	35	55	24	22	8	5	1	1	3.2	1.14
150	13.5	327	14	119	110	81	75	58	88	42	55	15	11	5	1	4.6	1.33
180	10.4	402	12	107	88	65	64	48	79	36	66	15	10	6	1	4.2	1.19
210	7.3	620	17	79	59	43	34	31	43	24	30	12	5	3	0	2.1	0.83
240	6.4	679	15	80	52	41	32	24	32	13	19	7	5	0	1	1.6	0.75
270	7.3	624	15	99	74	54	57	31	23	9	10	2	1	0	0	2.0	0.93
300	8.5	513	20	137	115	74	60	36	25	10	8	1	0	1	0	2.6	1.18
330	9.0	486	24	133	84	63	62	38	60	21	23	6	0	1	0	2.9	1.09
Total	100.0	525	17	114	84	60	52	36	50	23	27	7	4	2	0	2.8	1.01

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.3	2.8	2.0	1.2	0.7	0.5	0.4	0.5	0.5	1.8	2.3	2.7	1.5
3	2.3	2.6	1.9	1.2	0.7	0.4	0.3	0.5	0.7	1.6	2.2	2.7	1.4
6	2.3	2.4	2.0	1.3	0.9	0.8	0.6	0.5	0.9	1.7	2.1	2.7	1.5
9	3.0	3.3	3.3	3.0	2.7	2.7	2.2	2.3	2.6	3.0	2.8	3.2	2.8
12	3.6	4.1	4.5	4.4	4.0	4.1	4.1	4.5	3.8	3.7	3.5	4.2	4.0
15	3.3	4.2	4.5	4.6	4.0	4.3	4.7	5.0	4.2	3.9	3.0	3.6	4.1
18	2.3	2.9	2.4	2.0	1.9	2.3	2.4	1.9	1.4	1.9	2.3	3.0	2.2
21	2.2	2.9	2.0	1.4	0.7	0.8	0.6	0.7	0.8	1.8	2.4	3.0	1.6
Day	2.6	3.2	2.8	2.4	2.0	2.0	1.9	2.0	1.9	2.4	2.6	3.1	2.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	2.5	1.2	2.1	4.5	5.6	6.2	4.1	2.9	3.6	5.1	4.7	4.2
	1.24	0.84	0.67	0.80	1.12	1.33	1.40	1.01	0.86	1.06	1.38	1.11	1.08
25	6.0	2.8	1.3	2.3	4.9	6.1	6.8	4.5	3.2	4.0	5.7	5.1	4.7
	1.27	0.86	0.69	0.82	1.15	1.37	1.42	1.02	0.87	1.09	1.42	1.14	1.10
50	6.4	3.1	1.4	2.5	5.3	6.6	7.3	4.8	3.4	4.3	6.1	5.5	5.1
	1.30	0.88	0.70	0.84	1.18	1.40	1.46	1.05	0.89	1.12	1.45	1.17	1.13
100	6.9	3.3	1.5	2.7	5.7	7.1	7.8	5.2	3.7	4.6	6.6	5.9	5.4
	1.27	0.86	0.69	0.81	1.15	1.36	1.43	1.04	0.88	1.09	1.41	1.14	1.10
200	7.5	3.5	1.6	2.9	6.2	7.8	8.5	5.5	3.9	5.0	7.2	6.4	5.9
	1.22	0.82	0.66	0.78	1.09	1.29	1.38	1.01	0.85	1.04	1.34	1.09	1.06
Freq	9.2	6.4	5.8	6.7	9.5	12.9	10.6	7.6	6.6	7.3	8.4	8.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	1.1	1.0	1.6	3.2	3.8	4.2	2.3	1.9	2.5	3.6	3.2	2.8
	1.06	0.65	0.68	0.75	1.01	1.14	1.19	0.84	0.77	0.95	1.20	0.97	0.95
25	4.4	1.4	1.3	2.0	3.9	4.6	5.0	2.8	2.2	3.1	4.4	3.8	3.5
	1.12	0.69	0.73	0.80	1.08	1.22	1.24	0.87	0.80	1.02	1.28	1.03	1.00
50	5.1	1.8	1.6	2.5	4.7	5.5	5.8	3.3	2.6	3.7	5.2	4.5	4.1
	1.23	0.76	0.80	0.88	1.20	1.36	1.32	0.91	0.84	1.13	1.43	1.12	1.08
100	6.1	2.2	2.0	3.1	5.6	6.5	6.7	3.8	3.1	4.4	6.1	5.4	4.9
	1.31	0.80	0.84	0.93	1.27	1.45	1.42	0.97	0.89	1.20	1.52	1.20	1.15
200	7.3	2.7	2.3	3.7	6.9	8.0	7.9	4.4	3.6	5.4	7.6	6.5	5.9
	1.26	0.77	0.81	0.89	1.22	1.38	1.37	0.94	0.87	1.15	1.46	1.15	1.12
Freq	8.9	6.0	5.9	7.2	10.3	12.9	9.9	7.2	6.5	7.5	8.7	9.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	0.9	0.8	1.6	2.8	3.3	3.6	2.0	1.7	2.3	3.1	2.8	2.5
	1.02	0.65	0.65	0.80	1.02	1.14	1.17	0.84	0.80	0.99	1.17	0.98	0.95
25	3.7	1.2	1.0	2.1	3.5	4.2	4.4	2.5	2.2	2.9	3.8	3.5	3.1
	1.08	0.68	0.68	0.85	1.08	1.21	1.22	0.87	0.83	1.04	1.24	1.02	0.99
50	4.4	1.5	1.3	2.6	4.3	5.0	5.2	3.0	2.6	3.5	4.6	4.1	3.7
	1.17	0.74	0.74	0.92	1.19	1.32	1.29	0.90	0.87	1.14	1.36	1.10	1.07
100	5.3	1.9	1.7	3.2	5.2	6.0	6.1	3.6	3.1	4.3	5.5	5.0	4.5
	1.27	0.80	0.80	1.00	1.29	1.44	1.40	0.98	0.94	1.25	1.49	1.20	1.16
200	6.4	2.3	2.0	3.9	6.3	7.3	7.1	4.1	3.6	5.2	6.7	6.0	5.4
	1.23	0.77	0.77	0.96	1.24	1.39	1.36	0.95	0.91	1.20	1.43	1.16	1.12
Freq	8.7	6.0	6.0	7.5	10.6	12.6	9.6	7.1	6.6	7.6	8.8	9.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	0.6	0.6	1.4	2.3	2.7	2.7	1.5	1.4	1.9	2.5	2.3	1.9
	0.99	0.61	0.62	0.80	1.05	1.14	1.15	0.82	0.80	1.02	1.19	1.01	0.95
25	2.9	0.9	0.8	1.9	3.1	3.5	3.6	2.0	1.8	2.6	3.3	3.0	2.6
	1.03	0.63	0.65	0.84	1.11	1.20	1.18	0.85	0.82	1.08	1.25	1.05	0.99
50	3.6	1.1	1.0	2.3	3.8	4.3	4.3	2.5	2.2	3.2	4.0	3.7	3.2
	1.10	0.67	0.69	0.90	1.20	1.29	1.24	0.88	0.86	1.17	1.35	1.12	1.05
100	4.5	1.5	1.4	3.0	4.7	5.3	5.2	3.0	2.7	4.0	4.9	4.6	3.9
	1.23	0.75	0.76	1.02	1.36	1.45	1.34	0.94	0.93	1.32	1.52	1.25	1.16
200	5.3	1.7	1.6	3.6	5.7	6.4	6.1	3.5	3.2	4.8	5.9	5.5	4.7
	1.20	0.73	0.74	0.98	1.31	1.40	1.34	0.94	0.93	1.27	1.48	1.22	1.13
Freq	8.3	5.9	6.1	7.9	11.1	12.1	9.3	7.0	6.7	7.7	8.8	9.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.1	217	2.9	104	2.5	68	2.0	33
25	4.5	270	3.5	151	3.1	112	2.6	67
50	4.8	315	4.0	190	3.6	149	3.1	100
100	5.2	414	4.7	268	4.3	205	3.7	138
200	5.7	597	5.7	518	5.2	389	4.5	254

Limnos (Agio Sozon)

39° 29′ 24″ N 25° 13′ 12″ E	UTM 35 E 346923 m N 4372741 m	47 m a.s.l.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.02	800	0.009	1200	0.00							7	6
30	0.02	520	0.00									16	4
60	0.02	580	0.00									19	-1
90	0.02	570	0.00									12	-5
120	0.02	460	0.00									1	-4
150	0.02	430	0.00									-2	2
180	0.02	400	0.00									6	5
210	0.02	540	0.003	640	0.00							17	4
240	0.02											23	-2
270	0.02											14	-6
300	0.02											2	-5
330	0.02	2200	0.009									-1	2

Height of anemometer: 10.0 m a.g.l. Period: 86010100-87123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	11.6	10	33	79	184	219	219	79	73	37	50	17	0	0	0	5.6	2.19
30	36.3	2	19	33	92	73	57	65	74	84	167	141	77	70	46	10.5	2.32
60	17.2	6	21	43	68	51	53	66	77	89	177	147	87	50	65	10.9	2.23
90	2.2	37	145	223	225	131	85	39	51	39	16	9	0	0	0	4.1	1.56
120	1.6	71	215	237	176	96	77	13	35	19	35	19	6	0	0	3.6	1.23
150	2.7	43	74	150	214	98	68	54	94	78	67	33	22	4	2	5.6	1.53
180	9.3	7	26	47	99	72	75	74	92	124	218	69	45	26	26	9.4	2.46
210	8.6	10	26	75	99	106	94	95	81	76	135	90	58	38	19	8.5	1.94
240	3.5	16	47	88	135	156	147	140	101	71	75	20	3	3	0	6.3	2.30
270	1.9	36	177	177	154	115	104	73	63	52	26	5	13	5	0	4.7	1.53
300	1.3	51	309	316	156	74	47	23	12	8	0	4	0	0	0	2.9	1.51
330	3.6	25	98	93	206	227	243	82	19	4	0	3	0	0	0	4.8	3.29
Total	100.0	10	40	66	115	100	92	72	74	76	135	95	53	40	32	8.7	1.84

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-
Day	-	-	-	-	-	-	-	-	-	-	-	-	-

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	9.8	10.0	8.1	4.2	7.2	9.2	8.0	7.3	6.4	4.5	6.9	8.6
	1.48	2.27	2.22	1.65	1.19	1.67	2.35	1.96	2.55	2.08	1.56	3.15	1.92
25	7.9	10.7	10.9	8.8	4.7	7.9	10.1	8.8	8.0	7.0	4.9	7.6	9.4
	1.51	2.31	2.26	1.68	1.23	1.71	2.41	2.01	2.62	2.15	1.61	3.26	1.96
50	8.5	11.4	11.6	9.4	5.0	8.5	10.8	9.4	8.6	7.6	5.3	8.1	10.1
	1.55	2.38	2.32	1.73	1.26	1.76	2.48	2.07	2.69	2.20	1.65	3.34	2.01
100	9.1	12.2	12.5	10.1	5.4	9.1	11.6	10.2	9.3	8.2	5.7	8.9	10.8
	1.52	2.33	2.28	1.69	1.22	1.71	2.42	2.01	2.61	2.13	1.60	3.24	1.98
200	9.8	13.3	13.5	10.9	5.9	10.0	12.7	11.2	10.3	9.0	6.3	9.8	11.8
	1.47	2.25	2.20	1.63	1.16	1.63	2.31	1.91	2.47	2.02	1.51	3.06	1.92
Freq	15.2	30.2	15.7	4.5	2.0	3.7	9.2	7.6	3.2	2.1	1.6	4.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	7.0	7.1	4.9	3.1	5.5	6.3	5.4	4.9	4.2	3.9	5.1	6.0
	1.48	2.03	1.95	1.26	1.07	1.62	1.97	1.62	2.21	1.62	1.74	1.87	1.71
25	6.7	8.2	8.3	5.8	3.8	6.6	7.5	6.5	5.9	5.0	4.6	6.1	7.2
	1.55	2.12	2.04	1.31	1.15	1.73	2.09	1.74	2.38	1.74	1.88	2.02	1.79
50	7.6	9.3	9.4	6.7	4.6	7.6	8.6	7.5	6.8	5.9	5.4	7.1	8.2
	1.67	2.28	2.18	1.41	1.29	1.91	2.30	1.94	2.68	1.96	2.11	2.27	1.94
100	8.8	10.7	10.8	7.7	5.5	9.0	10.1	8.9	8.1	7.0	6.4	8.4	9.5
	1.79	2.45	2.34	1.51	1.37	2.05	2.46	2.07	2.86	2.08	2.25	2.42	2.09
200	10.5	12.7	12.7	9.1	6.8	11.0	12.2	10.9	10.0	8.7	7.9	10.4	11.4
	1.73	2.37	2.26	1.46	1.31	1.96	2.36	1.98	2.73	1.99	2.15	2.31	2.03
Freq	18.5	28.3	12.8	3.5	2.2	4.8	9.2	6.6	2.8	2.0	2.2	7.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	6.1	6.1	4.1	2.9	5.0	5.5	4.7	4.3	3.5	3.6	4.4	5.3
	1.56	2.03	1.94	1.22	1.08	1.70	1.92	1.62	2.17	1.58	1.94	1.74	1.71
25	6.2	7.4	7.5	5.0	3.6	6.1	6.7	5.8	5.3	4.4	4.4	5.5	6.4
	1.63	2.12	2.02	1.27	1.14	1.80	2.03	1.73	2.33	1.68	2.08	1.87	1.79
50	7.2	8.6	8.6	5.9	4.4	7.2	7.8	6.8	6.2	5.2	5.2	6.5	7.5
	1.74	2.26	2.13	1.35	1.26	1.96	2.20	1.90	2.57	1.86	2.30	2.06	1.92
100	8.4	9.9	9.9	6.9	5.3	8.5	9.1	8.1	7.3	6.2	6.2	7.7	8.8
	1.90	2.47	2.33	1.47	1.38	2.16	2.42	2.09	2.83	2.05	2.53	2.27	2.10
200	10.0	11.8	11.7	8.1	6.5	10.3	11.1	9.9	9.1	7.7	7.7	9.5	10.5
	1.84	2.39	2.26	1.42	1.32	2.07	2.33	2.01	2.71	1.96	2.42	2.17	2.05
Freq	19.8	26.9	11.9	3.3	2.4	5.3	9.1	6.3	2.7	1.9	2.5	8.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.8	4.8	3.0	2.6	4.0	4.2	3.7	3.3	2.7	3.0	3.6	4.1
	1.65	2.06	1.94	1.17	1.16	1.78	1.89	1.64	2.10	1.55	2.17	1.69	1.73
25	5.4	6.3	6.2	4.0	3.4	5.3	5.5	4.8	4.4	3.6	4.0	4.7	5.4
	1.72	2.13	2.00	1.22	1.23	1.87	1.99	1.73	2.23	1.64	2.30	1.79	1.80
50	6.5	7.5	7.4	4.8	4.2	6.3	6.6	5.8	5.3	4.4	4.8	5.7	6.5
	1.81	2.24	2.10	1.28	1.33	2.01	2.12	1.88	2.42	1.78	2.50	1.94	1.91
100	7.7	8.8	8.7	5.8	5.2	7.6	7.9	7.1	6.3	5.3	5.7	6.9	7.7
	1.99	2.45	2.28	1.40	1.51	2.27	2.39	2.14	2.76	2.03	2.85	2.20	2.11
200	9.2	10.5	10.3	6.9	6.3	9.2	9.6	8.6	7.7	6.4	7.0	8.4	9.3
	1.98	2.45	2.28	1.39	1.46	2.20	2.33	2.06	2.66	1.95	2.74	2.13	2.10
Freq	21.6	24.9	10.6	3.1	2.6	6.0	8.8	5.7	2.6	1.9	2.9	9.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.6	541	5.4	217	4.7	143	3.7	68
25	8.3	689	6.4	340	5.7	248	4.8	146
50	8.9	822	7.3	462	6.6	357	5.8	235
100	9.6	1041	8.4	671	7.8	521	6.9	359
200	10.4	1394	10.1	1187	9.3	916	8.2	619

Limnos (Airport)

40° 06′ 00″ N 24° 30′ 00″ E	UTM 35 E 286891 m N 4441928 m	5 m a.s.l.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	700	0.10	7000	0.01	9000	0.00					4	2
30	0.03	400	0.10	4000	0.01	5000	0.00					5	-1
60	0.03	400	0.10	3000	0.01	6000	0.04	15000	0.00			2	-3
90	0.03	400	0.10	12000	0.00							-4	-2
120	0.03	700	0.10	10000	0.00							-5	1
150	0.03	500	0.10	1500	0.01	5000	0.10	15000	0.00			-1	3
180	0.03	1000	0.10	2000	0.00	7000	0.01	10000	0.00			3	2
210	0.03	1000	0.10	1800	0.001	5000	0.10	6000	0.004	10000	0.10	5	-1
240	0.03	1000	0.07	2000	0.10	17000	0.00					2	-3
270	0.03	1000	0.07	2000	0.10	15000	0.00					-4	-2
300	0.03	1000	0.07	1500	0.10	13000	0.01	16000	0.00			-5	1
330	0.03	600	0.07	1200	0.10	12000	0.00					-1	3

Height of anemometer: 18.0 m a.g.l. Period: 74010100–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.9	279	12	139	156	107	98	55	90	20	29	15	0	0	0	4.4	1.54
30	15.1	109	5	94	127	160	138	84	101	60	75	19	19	5	5	6.1	1.76
60	36.9	45	5	60	87	111	115	79	135	62	141	75	37	28	20	8.3	1.95
90	3.0	547	6	119	62	108	85	28	45	0	0	0	0	0	0	2.5	1.19
120	2.5	662	0	76	89	76	62	21	14	0	0	0	0	0	0	1.6	0.93
150	5.4	308	10	80	102	108	121	51	80	22	32	51	6	13	16	5.3	1.33
180	9.4	176	7	40	60	93	115	98	113	77	124	58	16	13	10	7.4	1.90
210	4.9	334	3	83	87	128	80	73	87	45	42	21	3	7	7	5.1	1.47
240	4.9	337	11	129	105	116	74	77	77	25	32	11	4	4	0	4.3	1.43
270	2.4	698	0	101	87	29	43	14	7	0	14	7	0	0	0	1.3	0.76
300	2.4	678	0	49	70	21	35	28	35	0	42	35	0	0	7	1.9	0.71
330	7.2	229	12	167	174	162	124	59	52	5	14	2	0	0	0	4.3	1.98
Total	100.0	198	6	84	101	116	109	71	100	45	84	42	19	14	10	6.3	1.55

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	–	–	–	–	–	–	–	–	–	–	–	–	–
9	–	–	–	–	–	–	–	–	–	–	–	–	–
12	–	–	–	–	–	–	–	–	–	–	–	–	–
15	–	–	–	–	–	–	–	–	–	–	–	–	–
18	–	–	–	–	–	–	–	–	–	–	–	–	–
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	–	–	–	–	–	–	–	–	–	–	–	–	–

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	7.0	10.3	9.0	4.2	6.8	7.9	6.2	5.6	3.3	3.2	5.3	7.6
	1.57	1.70	1.93	1.60	1.01	1.35	1.79	1.52	1.50	1.02	0.83	1.71	1.50
25	5.8	7.7	11.2	9.8	4.6	7.4	8.7	6.8	6.1	3.6	3.5	5.8	8.3
	1.62	1.75	1.95	1.62	1.03	1.37	1.84	1.57	1.55	1.05	0.84	1.76	1.52
50	6.2	8.3	11.9	10.4	5.0	7.9	9.3	7.3	6.6	3.9	3.8	6.3	8.9
	1.66	1.80	1.99	1.65	1.05	1.41	1.89	1.62	1.59	1.08	0.86	1.80	1.55
100	6.8	8.9	12.7	11.1	5.3	8.5	10.0	7.9	7.1	4.2	4.0	6.8	9.6
	1.60	1.74	1.98	1.64	1.03	1.38	1.84	1.56	1.54	1.04	0.85	1.75	1.54
200	7.4	9.9	13.6	11.9	5.7	9.1	11.0	8.7	7.8	4.5	4.3	7.5	10.4
	1.52	1.65	1.93	1.60	0.99	1.34	1.76	1.48	1.46	0.99	0.83	1.65	1.51
Freq	6.0	12.5	31.2	10.8	3.5	5.3	8.3	5.2	4.7	3.1	2.9	6.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	5.2	7.4	5.3	2.1	5.0	5.5	3.7	3.7	1.6	2.6	3.7	5.3
	1.32	1.43	1.75	1.24	0.82	1.27	1.57	1.20	1.23	0.76	0.85	1.53	1.34
25	4.6	6.2	8.6	6.3	2.6	5.9	6.6	4.5	4.4	2.0	3.2	4.5	6.3
	1.42	1.51	1.80	1.28	0.87	1.33	1.67	1.29	1.32	0.80	0.88	1.65	1.39
50	5.4	7.1	9.7	7.2	3.2	6.8	7.6	5.3	5.2	2.5	3.7	5.2	7.2
	1.59	1.65	1.88	1.34	0.97	1.42	1.84	1.44	1.48	0.89	0.94	1.86	1.48
100	6.5	8.4	11.0	8.2	3.9	7.9	8.9	6.4	6.3	3.0	4.3	6.2	8.3
	1.69	1.77	2.02	1.43	1.02	1.52	1.97	1.53	1.58	0.94	1.00	1.98	1.59
200	8.0	10.1	12.6	9.4	4.7	9.2	10.8	7.9	7.8	3.7	5.1	7.7	9.9
	1.62	1.70	1.97	1.40	0.98	1.48	1.89	1.47	1.51	0.90	0.97	1.89	1.58
Freq	6.3	15.2	32.6	6.0	3.1	6.1	8.4	4.5	4.6	2.8	3.3	7.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	4.8	6.4	4.5	2.2	4.4	4.7	3.3	3.1	1.4	2.5	3.2	4.6
	1.35	1.47	1.76	1.22	0.87	1.32	1.56	1.22	1.21	0.73	0.93	1.51	1.35
25	4.4	5.9	7.8	5.6	2.8	5.4	5.8	4.1	3.9	1.7	3.2	4.0	5.7
	1.44	1.53	1.81	1.26	0.92	1.38	1.65	1.30	1.29	0.77	0.98	1.62	1.40
50	5.2	6.9	8.9	6.4	3.4	6.3	6.8	4.9	4.6	2.2	3.8	4.7	6.6
	1.59	1.64	1.88	1.31	1.00	1.46	1.80	1.44	1.42	0.84	1.05	1.79	1.48
100	6.2	8.1	10.2	7.4	4.2	7.4	8.1	5.9	5.6	2.7	4.6	5.7	7.7
	1.74	1.79	2.03	1.42	1.09	1.60	1.98	1.57	1.56	0.91	1.14	1.96	1.60
200	7.7	9.6	11.8	8.6	5.1	8.8	9.8	7.3	6.9	3.3	5.4	7.0	9.1
	1.67	1.74	1.99	1.38	1.05	1.55	1.90	1.51	1.49	0.87	1.10	1.88	1.59
Freq	7.0	16.9	30.2	5.7	3.4	6.3	8.1	4.5	4.4	2.8	3.7	7.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	4.0	5.0	3.4	2.1	3.6	3.6	2.5	2.3	1.1	2.2	2.5	3.6
	1.37	1.51	1.73	1.19	0.95	1.38	1.54	1.20	1.16	0.72	1.04	1.50	1.35
25	3.8	5.3	6.5	4.5	2.8	4.7	4.8	3.4	3.1	1.5	2.9	3.4	4.7
	1.45	1.56	1.77	1.22	0.99	1.44	1.62	1.27	1.23	0.75	1.10	1.59	1.39
50	4.7	6.3	7.7	5.3	3.5	5.6	5.8	4.1	3.8	1.9	3.6	4.1	5.7
	1.58	1.63	1.83	1.26	1.06	1.51	1.74	1.37	1.33	0.80	1.18	1.72	1.46
100	5.7	7.5	9.0	6.3	4.3	6.7	7.0	5.1	4.7	2.4	4.5	5.0	6.8
	1.79	1.77	1.93	1.35	1.19	1.66	1.96	1.56	1.51	0.89	1.34	1.96	1.58
200	6.9	8.9	10.4	7.4	5.1	8.0	8.4	6.2	5.7	2.9	5.5	6.1	8.1
	1.73	1.77	1.96	1.36	1.15	1.65	1.90	1.51	1.46	0.86	1.29	1.89	1.59
Freq	8.0	19.3	26.8	5.4	3.7	6.7	7.5	4.6	4.2	2.8	4.2	6.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.9	540	4.8	226	4.2	148	3.3	71
25	7.5	686	5.7	348	5.2	254	4.3	150
50	8.0	813	6.5	462	6.0	358	5.1	236
100	8.6	1018	7.5	638	6.9	499	6.1	349
200	9.3	1345	8.8	1074	8.2	842	7.2	576

Mytilini

39° 06′ 00″ N	26° 33′ 00″ E	UTM 35	E 461086 m	N 4328043 m	17 m a.s.l.

Located in an airport SE of the city of Mytilini on the island of Lesbos. The terrain is flat and there are no trees within 60 m. The NW-SE running coastline appears to the NE at a distance of 250 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00											-2	-5
30	0.00											-12	-5
60	0.00											-16	1
90	0.00											-10	6
120	0.00												5
150	0.007	2000	0.03	5000	0.00							4	-1
180	0.01	1000	0.10	2000	0.25	6500	0.00					-4	-8
210	0.01	750	0.10	1500	0.25	6000	0.03	12500	0.00			-19	-9
240	0.01	500	0.10	1000	0.25							-27	1
270	0.01	500	0.10	1500	0.25	5500	0.00	10000	0.15			-16	9
300	0.01	500	0.10	1000	0.20							-1	7
330	0.00	5500	0.03									4	-1

Height of anemometer: 8.0 m a.g.l. Period: 74010100–83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	15.8	78	41	143	116	111	85	92	92	69	97	44	19	8	5	6.5	1.76
30	9.9	140	39	77	51	42	52	56	90	77	180	123	49	16	7	8.6	2.33
60	3.3	409	60	138	101	64	53	29	38	28	47	23	8	3	0	3.2	1.04
90	4.2	330	72	115	95	107	86	61	65	29	34	6	0	0	0	3.9	1.42
120	5.2	242	44	112	132	139	115	83	74	24	27	9	1	0	0	4.7	1.80
150	9.0	145	21	73	107	139	117	82	100	63	93	44	10	3	0	6.2	1.87
180	8.0	153	27	95	95	95	82	60	86	63	134	63	27	12	7	6.9	1.70
210	6.9	190	73	197	95	81	70	51	78	43	74	32	12	3	0	4.8	1.36
240	6.7	188	127	318	124	59	56	38	33	26	26	5	1	0	0	3.0	1.15
270	6.0	245	135	335	166	55	31	7	13	5	6	2	1	0	0	2.9	1.59
300	10.4	142	73	280	202	133	80	35	27	15	12	0	0	0	0	3.7	1.74
330	14.5	91	27	94	129	158	139	116	121	62	55	6	1	1	0	5.9	2.33
Total	100.0	160	55	157	119	105	86	67	76	48	73	33	12	5	2	5.3	1.49

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.3	5.6	4.2	3.8	2.7	2.6	3.6	3.6	3.4	3.6	4.3	5.6	4.0
3	5.3	5.9	4.2	3.7	2.6	2.7	3.7	3.9	3.5	3.8	4.5	5.5	4.1
6	5.2	6.0	4.7	4.2	3.4	3.9	4.7	4.8	4.1	3.6	4.5	5.5	4.5
9	5.4	6.1	5.1	5.0	4.4	4.5	5.7	5.7	5.0	4.5	5.0	5.7	5.2
12	5.7	6.2	5.3	5.1	4.7	5.0	5.9	6.0	5.4	5.0	5.4	5.5	5.4
15	5.5	6.0	5.0	4.5	4.3	4.9	5.8	5.8	5.0	4.4	4.8	5.5	5.1
18	5.5	6.4	5.0	4.1	3.3	3.5	4.5	4.7	4.2	4.2	4.6	5.6	4.6
21	5.4	5.9	4.2	4.1	2.9	3.0	4.0	3.9	3.6	3.8	4.3	5.5	4.3
Day	5.4	6.0	4.7	4.3	3.6	3.8	4.8	4.9	4.3	4.1	4.7	5.5	4.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.6	9.0	5.9	4.7	5.0	7.1	8.9	9.1	7.1	5.9	6.4	6.5	7.0
	1.79	2.00	1.26	1.42	1.74	1.81	1.67	1.44	1.25	1.64	1.99	2.69	1.53
25	7.3	9.8	6.5	5.2	5.4	7.7	9.7	9.9	7.7	6.4	7.1	7.1	7.7
	1.85	2.04	1.28	1.46	1.79	1.87	1.70	1.45	1.26	1.69	2.06	2.78	1.56
50	7.8	10.5	7.0	5.6	5.8	8.3	10.4	10.6	8.3	6.9	7.6	7.6	8.2
	1.90	2.10	1.32	1.50	1.84	1.92	1.74	1.47	1.28	1.73	2.11	2.85	1.60
100	8.4	11.3	7.5	6.0	6.3	9.0	11.1	11.3	8.8	7.5	8.2	8.2	8.9
	1.84	2.06	1.29	1.46	1.78	1.86	1.72	1.47	1.28	1.68	2.04	2.76	1.58
200	9.3	12.3	8.1	6.6	7.0	9.9	11.9	12.0	9.4	8.3	9.1	9.1	9.7
	1.74	1.98	1.24	1.38	1.69	1.76	1.67	1.44	1.26	1.59	1.94	2.61	1.55
Freq	14.2	12.2	5.3	4.6	4.9	6.8	7.1	8.0	8.4	8.0	9.0	11.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	6.5	3.3	3.2	3.7	5.1	6.5	6.3	4.7	4.0	4.6	4.6	4.9
	1.47	1.80	0.99	1.29	1.44	1.51	1.50	1.28	1.15	1.61	1.76	2.18	1.37
25	5.7	7.7	4.0	3.9	4.4	6.1	7.6	7.3	5.6	4.8	5.5	5.5	5.8
	1.58	1.89	1.04	1.39	1.55	1.62	1.55	1.31	1.18	1.74	1.90	2.36	1.43
50	6.6	8.8	4.7	4.6	5.2	7.1	8.6	8.3	6.3	5.6	6.3	6.3	6.7
	1.78	2.04	1.14	1.56	1.74	1.81	1.62	1.35	1.23	1.95	2.14	2.65	1.54
100	7.9	10.1	5.6	5.5	6.2	8.4	9.8	9.3	7.2	6.6	7.5	7.5	7.9
	1.89	2.19	1.22	1.66	1.85	1.93	1.74	1.43	1.31	2.08	2.28	2.82	1.67
200	9.8	12.0	6.7	6.8	7.7	10.4	11.2	10.5	8.2	8.3	9.4	9.3	9.5
	1.81	2.12	1.17	1.58	1.77	1.85	1.69	1.40	1.27	1.99	2.17	2.69	1.67
Freq	14.1	11.0	4.5	4.7	5.1	7.0	7.1	8.2	8.7	8.0	9.7	11.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	5.6	2.8	2.8	3.4	4.6	5.6	5.3	3.9	3.5	4.0	4.1	4.2
	1.47	1.76	1.00	1.32	1.44	1.51	1.49	1.26	1.12	1.56	1.83	2.13	1.36
25	5.2	6.8	3.5	3.5	4.2	5.6	6.8	6.4	4.8	4.3	4.9	5.0	5.2
	1.57	1.83	1.05	1.41	1.54	1.60	1.53	1.28	1.15	1.67	1.96	2.28	1.42
50	6.2	7.9	4.2	4.2	4.9	6.6	7.9	7.4	5.5	5.1	5.8	5.8	6.1
	1.74	1.96	1.14	1.55	1.70	1.74	1.59	1.32	1.19	1.85	2.16	2.52	1.52
100	7.4	9.2	5.1	5.1	5.9	7.8	9.0	8.4	6.4	6.1	6.9	7.0	7.2
	1.91	2.14	1.25	1.71	1.87	1.92	1.71	1.38	1.27	2.03	2.38	2.77	1.66
200	9.1	10.9	6.2	6.2	7.3	9.5	10.4	9.6	7.3	7.5	8.5	8.6	8.7
	1.83	2.07	1.20	1.63	1.79	1.84	1.68	1.38	1.25	1.94	2.27	2.65	1.66
Freq	13.8	10.4	4.6	4.7	5.3	7.0	7.2	8.3	8.7	8.1	9.9	12.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	4.3	2.2	2.3	2.8	3.7	4.4	4.0	3.1	2.9	3.2	3.2	3.4
	1.49	1.70	1.02	1.35	1.44	1.51	1.46	1.22	1.16	1.67	1.90	2.03	1.37
25	4.6	5.6	3.0	3.0	3.7	4.9	5.7	5.2	4.1	3.8	4.2	4.2	4.4
	1.57	1.76	1.08	1.42	1.52	1.58	1.49	1.24	1.19	1.77	2.01	2.15	1.43
50	5.5	6.7	3.7	3.7	4.5	5.9	6.8	6.1	4.8	4.6	5.0	5.1	5.3
	1.69	1.85	1.16	1.54	1.65	1.68	1.54	1.27	1.23	1.92	2.19	2.34	1.51
100	6.7	7.9	4.6	4.5	5.4	7.0	8.0	7.2	5.7	5.6	6.0	6.2	6.4
	1.92	2.03	1.31	1.76	1.88	1.87	1.62	1.32	1.30	2.19	2.49	2.67	1.65
200	8.1	9.4	5.6	5.5	6.6	8.4	9.3	8.3	6.7	6.8	7.4	7.5	7.7
	1.86	2.02	1.27	1.69	1.81	1.83	1.65	1.35	1.32	2.11	2.40	2.57	1.67
Freq	13.4	9.5	4.6	4.7	5.5	7.0	7.4	8.3	8.6	8.3	10.2	12.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.3	408	4.5	171	3.9	113	3.1	55
25	6.9	517	5.3	265	4.8	194	4.0	115
50	7.4	615	6.1	354	5.5	275	4.8	182
100	8.0	776	7.0	499	6.5	391	5.7	272
200	8.7	1042	8.5	880	7.8	680	6.9	460

Naxos

37° 00′ 00″ N	25° 23′ 00″ E	UTM 35	E 356143 m	N 4096160 m	9 m a.s.l.

Located on the N side of a promontory on the W coast of the island of Naxos. The sea occurs in the S to N through W sectors at varying distances (30 to a few hundreds of metres), and the N coast forms an escarpment. To the NE, E and SE the island rises to a height of almost 1000 m a.s.l. The city of Naxos is found in the sectors NE, E and SE and extends all the way to the station.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00											2	1
30	0.00	500	0.02	1000	0.00								-3
60	0.30	1000	0.20									-10	-6
90	0.30	1000	0.20									-18	-2
120	0.10	200	0.20									-14	5
150	0.00	100	0.10	200	0.00	500	0.20					-4	6
180	0.00	1000	0.10	1500	0.20							3	1
210	0.00	1500	0.02	2000	0.10	3600	0.00						-3
240	0.00	2300	0.10	3500	0.00							-7	-4
270	0.00											-11	-1
300	0.00											-9	3
330	0.00											-3	4

Height of anemometer: 10.0 m a.g.l. Period: 74010100-83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	36.7	34	40	63	67	54	59	63	69	60	142	138	96	51	64	10.5	2.18
30	13.8	80	74	97	104	85	76	92	85	70	103	62	36	15	22	7.3	1.64
60	1.5	630	128	116	47	35	14	21	7	2	0	0	0	0	0	1.2	0.86
90	1.8	584	121	189	62	22	6	4	0	4	0	6	2	0	0	1.4	0.89
120	5.3	238	229	244	125	44	21	14	15	15	19	18	10	6	2	2.5	0.90
150	9.2	138	169	170	110	76	51	49	45	42	66	41	20	13	11	4.6	1.13
180	9.7	124	70	92	102	85	78	83	74	68	121	64	19	13	7	6.8	1.72
210	5.2	184	48	78	97	90	85	83	87	55	94	50	34	11	5	6.4	1.62
240	2.0	462	62	55	73	68	53	48	47	40	42	21	21	5	3	3.6	1.04
270	1.8	527	56	87	60	45	45	43	37	26	54	10	6	2	2	2.6	0.90
300	2.1	466	61	77	80	61	55	46	31	24	51	38	9	2	0	3.3	1.02
330	11.0	93	42	56	51	30	38	39	40	50	136	149	129	79	70	11.5	2.42
Total	100.0	129	74	93	82	61	57	61	60	53	108	91	61	33	36	7.9	1.56

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	8.0	8.4	6.6	4.7	3.6	3.5	5.2	5.8	6.0	6.3	7.0	7.3	6.0
3	8.0	8.2	6.9	5.0	3.6	3.6	6.1	7.0	6.6	6.5	7.3	7.3	6.3
6	7.7	8.0	6.7	5.1	4.7	4.8	6.8	7.5	7.1	6.2	7.0	7.0	6.5
9	8.2	8.4	7.7	6.2	5.9	6.0	7.5	8.3	7.6	7.1	7.8	7.6	7.4
12	8.7	9.0	8.4	6.9	6.3	6.4	8.0	8.4	8.0	7.6	8.2	8.1	7.8
15	8.4	8.8	7.9	6.4	6.1	6.1	7.7	8.3	8.0	7.5	7.5	7.4	7.5
18	8.0	8.5	7.0	5.1	4.3	4.4	5.8	6.7	6.7	6.9	7.5	7.5	6.5
21	7.8	8.6	6.5	4.8	3.7	3.4	5.0	5.3	6.1	6.6	7.2	7.4	6.0
Day	8.1	8.5	7.2	5.5	4.8	4.8	6.5	7.2	7.0	6.9	7.4	7.5	6.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.4	8.4	8.9	4.7	5.4	7.0	8.4	6.9	5.3	3.4	6.5	11.4	8.7
	2.19	1.72	1.17	0.88	0.91	1.22	1.81	1.61	1.27	0.96	1.17	2.30	1.57
25	11.3	9.2	9.7	5.1	5.9	7.6	9.1	7.6	5.9	3.8	7.1	12.5	9.5
	2.23	1.75	1.18	0.89	0.91	1.23	1.85	1.65	1.31	0.99	1.18	2.33	1.59
50	12.1	9.9	10.3	5.5	6.3	8.1	9.8	8.2	6.3	4.1	7.6	13.3	10.2
	2.28	1.80	1.19	0.90	0.92	1.25	1.90	1.70	1.34	1.01	1.20	2.38	1.62
100	12.9	10.6	10.9	5.8	6.7	8.6	10.5	8.8	6.8	4.4	8.1	14.2	10.9
	2.25	1.77	1.19	0.90	0.92	1.24	1.86	1.65	1.30	0.99	1.19	2.36	1.61
200	13.9	11.4	11.5	6.2	7.0	9.2	11.3	9.6	7.4	4.8	8.7	15.2	11.7
	2.19	1.71	1.19	0.89	0.91	1.23	1.80	1.57	1.24	0.94	1.17	2.30	1.58
Freq	29.8	15.4	4.7	2.5	5.8	8.4	8.4	5.4	2.8	2.1	3.2	11.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	5.6	7.0	3.0	4.1	5.2	5.9	4.5	3.1	2.3	5.8	8.0	6.2
	1.92	1.43	1.12	0.90	0.91	1.21	1.70	1.35	0.99	0.82	1.30	2.06	1.44
25	8.5	6.6	8.1	3.6	4.8	6.1	7.1	5.5	3.8	2.8	6.8	9.3	7.3
	1.99	1.49	1.12	0.93	0.92	1.24	1.79	1.45	1.05	0.86	1.34	2.13	1.49
50	9.6	7.6	9.1	4.1	5.4	6.9	8.1	6.4	4.6	3.4	7.7	10.5	8.2
	2.12	1.60	1.13	0.97	0.94	1.29	1.94	1.63	1.17	0.93	1.40	2.24	1.56
100	10.9	8.7	10.0	4.8	6.1	7.8	9.3	7.6	5.5	4.1	8.8	11.9	9.4
	2.28	1.72	1.16	1.03	0.97	1.38	2.08	1.73	1.24	0.99	1.49	2.40	1.66
200	12.8	10.3	11.1	5.5	6.7	8.9	11.1	9.5	6.7	4.8	10.0	13.7	11.0
	2.20	1.66	1.17	1.01	0.97	1.35	2.00	1.65	1.19	0.95	1.46	2.33	1.65
Freq	30.5	11.8	3.4	2.6	6.9	8.7	8.0	4.6	2.4	2.2	4.2	14.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.2	4.9	5.8	2.9	3.6	4.6	5.2	3.9	2.6	2.3	5.5	6.8	5.4
	1.90	1.41	1.08	0.92	0.93	1.26	1.71	1.33	0.97	0.85	1.44	2.02	1.45
25	7.6	6.0	7.0	3.5	4.4	5.6	6.3	4.8	3.3	2.8	6.7	8.2	6.5
	1.97	1.46	1.09	0.94	0.94	1.29	1.78	1.42	1.03	0.88	1.48	2.08	1.49
50	8.7	7.0	7.9	4.1	5.0	6.5	7.3	5.8	4.0	3.4	7.7	9.4	7.5
	2.07	1.54	1.10	0.97	0.95	1.34	1.91	1.57	1.12	0.93	1.54	2.17	1.55
100	10.0	8.1	8.9	4.7	5.7	7.4	8.6	6.9	4.9	4.1	8.9	10.8	8.7
	2.26	1.68	1.12	1.02	0.98	1.43	2.10	1.73	1.23	1.01	1.65	2.35	1.67
200	11.7	9.5	9.9	5.4	6.4	8.6	10.2	8.5	6.0	4.8	10.2	12.5	10.2
	2.19	1.63	1.14	1.02	0.99	1.41	2.03	1.65	1.18	0.98	1.63	2.30	1.66
Freq	28.9	10.9	3.3	3.0	7.1	8.6	7.7	4.4	2.4	2.3	5.0	16.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	3.9	4.2	2.4	2.9	3.7	4.0	3.0	2.0	2.1	4.7	5.2	4.2
	1.87	1.38	1.03	0.92	0.96	1.32	1.70	1.31	0.95	0.89	1.60	1.97	1.46
25	6.3	5.1	5.4	3.1	3.8	4.8	5.2	4.0	2.7	2.7	6.1	6.7	5.5
	1.93	1.41	1.03	0.94	0.98	1.35	1.76	1.38	1.00	0.92	1.63	2.02	1.49
50	7.5	6.1	6.3	3.7	4.5	5.8	6.3	4.9	3.3	3.3	7.2	7.9	6.5
	2.01	1.47	1.04	0.96	0.99	1.39	1.87	1.50	1.08	0.96	1.69	2.10	1.54
100	8.8	7.2	7.3	4.4	5.3	6.8	7.5	6.0	4.2	4.0	8.4	9.3	7.7
	2.17	1.57	1.06	1.00	1.01	1.48	2.07	1.71	1.21	1.03	1.79	2.24	1.64
200	10.3	8.5	8.3	5.1	6.1	7.9	8.9	7.3	5.1	4.7	9.9	10.9	9.0
	2.19	1.58	1.08	1.02	1.04	1.50	2.04	1.64	1.17	1.03	1.82	2.27	1.67
Freq	26.5	9.7	3.2	3.5	7.4	8.6	7.3	4.1	2.3	2.4	6.1	18.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.8	749	5.6	307	4.9	201	3.8	96
25	8.5	954	6.6	475	5.9	345	5.0	204
50	9.1	1129	7.4	638	6.8	492	5.9	324
100	9.7	1391	8.4	864	7.8	680	6.9	482
200	10.5	1788	9.8	1375	9.1	1082	8.1	761

Rodos

36° 23′ 00″ N	28° 07′ 00″ E	UTM 35	E 600159 m	N 4027111 m	4 m a.s.l.

Located at the airport in the northern part of the island of Rodos, with the sea to the N and NE about 300 m away. The slope of the terrain is approx. 2% and there are no trees within a distance of 200 m from the station. A series of 200-250 m high hills are found 200 m to the S. The 12.5-m high airport control tower is situated 60 m to the E.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	300	0.00									-9	1
30	0.01	500	0.00									-5	4
60	0.01	1000	0.004									2	3
90	0.01	300	0.10	1000	0.30							4	-1
120	0.01	200	0.30									-2	-5
150	0.01	150	0.30									-10	-4
180	0.01	200	0.20									-12	1
210	0.01	250	0.30									-6	5
240	0.01	350	0.30									2	4
270	0.01	800	0.001									3	-1
300	0.01	500	0.00									-1	-4
330	0.01	300	0.00									-8	-3

Height of anemometer: 7.0 m a.g.l. Period: 74010100–83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.9	464	27	69	83	81	69	57	69	19	40	16	5	0	1	3.6	1.18
30	2.5	694	21	70	72	57	42	10	18	8	4	3	0	1	0	1.3	0.76
60	2.5	703	30	75	66	59	27	11	15	7	4	2	0	0	0	1.1	0.74
90	4.8	374	68	146	104	91	82	37	41	18	24	9	3	1	3	3.3	1.13
120	6.7	259	71	151	102	110	100	37	59	22	40	20	14	8	8	4.5	1.21
150	5.3	331	65	144	81	91	60	31	50	19	63	20	17	20	9	4.1	1.03
180	4.3	408	62	166	130	82	58	23	20	11	25	9	2	2	1	3.0	1.12
210	4.5	400	74	193	120	82	59	29	20	10	13	0	1	0	0	2.9	1.28
240	16.5	101	27	117	135	156	153	83	100	45	68	10	3	1	0	5.7	2.05
270	28.1	61	13	66	106	143	149	107	140	73	112	21	7	1	0	6.7	2.34
300	14.0	126	13	65	90	119	116	111	131	67	112	28	14	5	1	6.8	2.17
330	6.8	250	18	71	79	120	104	86	93	47	92	19	15	5	2	5.8	1.70
Total	100.0	210	31	99	104	121	114	76	95	46	75	17	8	3	2	5.6	1.72

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.2	3.5	2.8	3.3	2.7	3.1	4.1	4.6	4.0	2.3	2.5	3.2	3.3
3	3.2	3.8	3.1	3.6	2.6	2.9	4.0	4.6	3.8	2.1	2.5	3.5	3.3
6	3.5	4.2	3.4	4.3	4.0	4.8	5.5	5.8	4.5	2.7	2.5	3.3	4.1
9	4.3	5.2	4.7	5.8	5.5	6.1	6.6	6.9	5.8	4.4	3.9	4.1	5.3
12	5.0	5.9	5.6	6.6	6.5	7.2	8.0	8.4	7.3	5.3	4.7	4.8	6.3
15	4.3	5.5	5.6	6.2	6.5	7.4	8.3	8.7	7.7	5.0	3.7	4.0	6.1
18	3.8	4.5	3.7	4.5	4.2	5.3	6.2	6.6	5.3	3.5	3.1	3.4	4.5
21	3.4	4.0	3.2	3.8	3.2	3.8	4.7	5.3	4.4	2.7	2.8	3.1	3.7
Day	3.8	4.6	4.0	4.8	4.4	5.1	5.9	6.4	5.3	3.5	3.2	3.7	4.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	2.3	1.9	5.2	7.5	8.4	6.4	7.2	9.5	8.6	7.8	7.3	7.6
	1.37	0.86	0.91	1.24	1.23	1.09	1.07	1.54	2.29	2.73	2.24	1.90	1.56
25	5.9	2.5	2.1	5.7	8.2	9.1	6.9	7.8	10.3	9.4	8.5	8.0	8.3
	1.41	0.88	0.94	1.26	1.24	1.09	1.08	1.57	2.33	2.82	2.32	1.96	1.59
50	6.3	2.7	2.2	6.1	8.8	9.7	7.4	8.4	11.1	10.1	9.1	8.6	8.9
	1.45	0.90	0.96	1.29	1.26	1.10	1.09	1.61	2.40	2.89	2.38	2.01	1.62
100	6.8	2.9	2.4	6.6	9.3	10.3	7.9	9.0	11.9	10.9	9.9	9.3	9.6
	1.40	0.88	0.93	1.27	1.26	1.10	1.09	1.58	2.35	2.80	2.30	1.95	1.62
200	7.5	3.1	2.6	7.1	9.9	10.8	8.4	9.7	12.9	12.1	11.0	10.3	10.5
	1.33	0.84	0.89	1.23	1.24	1.10	1.08	1.52	2.26	2.65	2.18	1.84	1.60
Freq	5.1	3.0	2.4	3.7	5.7	6.1	5.3	6.2	13.4	23.0	16.7	9.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	0.9	1.3	3.9	5.6	6.2	4.2	5.2	6.7	5.9	5.4	4.8	5.3
	0.99	0.65	0.78	1.15	1.19	1.05	1.10	1.46	2.07	2.40	1.84	1.50	1.41
25	3.5	1.1	1.6	4.7	6.6	7.2	5.0	6.2	8.0	7.0	6.4	5.8	6.3
	1.06	0.69	0.83	1.21	1.21	1.06	1.13	1.53	2.18	2.59	1.99	1.62	1.48
50	4.2	1.4	1.9	5.4	7.4	8.0	5.7	7.1	9.1	8.1	7.5	6.8	7.3
	1.19	0.76	0.92	1.30	1.24	1.07	1.19	1.65	2.37	2.92	2.23	1.81	1.58
100	5.0	1.8	2.4	6.3	8.3	8.9	6.6	8.3	10.5	9.6	8.9	8.1	8.5
	1.26	0.80	0.98	1.39	1.30	1.09	1.27	1.77	2.54	3.10	2.38	1.93	1.70
200	6.2	2.2	2.9	7.5	9.4	9.8	7.5	9.8	12.5	11.9	11.0	10.1	10.3
	1.20	0.77	0.94	1.35	1.29	1.10	1.24	1.71	2.45	2.97	2.27	1.85	1.72
Freq	4.3	2.6	2.3	4.1	6.1	6.1	5.1	6.6	15.9	24.4	14.5	8.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	0.8	1.4	3.5	4.9	5.2	3.8	4.8	5.8	5.1	4.7	4.2	4.6
	0.97	0.66	0.83	1.13	1.17	1.04	1.14	1.58	2.08	2.45	1.84	1.47	1.42
25	3.0	1.0	1.8	4.3	6.0	6.3	4.7	5.9	7.0	6.3	5.8	5.2	5.7
	1.03	0.70	0.88	1.17	1.19	1.04	1.18	1.65	2.19	2.62	1.97	1.57	1.48
50	3.7	1.3	2.2	5.1	6.8	7.1	5.4	6.9	8.2	7.4	6.8	6.1	6.7
	1.13	0.75	0.96	1.24	1.21	1.06	1.23	1.76	2.36	2.90	2.18	1.73	1.58
100	4.5	1.7	2.8	5.9	7.8	8.0	6.3	8.1	9.5	8.8	8.1	7.3	7.9
	1.24	0.81	1.04	1.35	1.26	1.08	1.33	1.93	2.59	3.19	2.40	1.90	1.71
200	5.5	2.0	3.4	6.9	8.8	9.0	7.3	9.6	11.4	10.8	10.0	9.0	9.5
	1.19	0.79	1.01	1.31	1.27	1.09	1.30	1.87	2.50	3.05	2.29	1.82	1.73
Freq	4.1	2.5	2.5	4.3	6.1	6.1	5.2	7.4	16.7	23.5	13.9	7.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	0.7	1.5	3.0	3.9	3.9	3.1	4.0	4.4	4.1	3.7	3.2	3.7
	0.95	0.68	0.90	1.15	1.15	1.03	1.18	1.70	2.11	2.44	1.81	1.43	1.44
25	2.4	0.9	2.0	3.9	5.1	5.1	4.0	5.3	5.8	5.3	4.8	4.2	4.8
	1.00	0.72	0.95	1.19	1.17	1.03	1.21	1.77	2.21	2.59	1.92	1.51	1.49
50	3.0	1.2	2.4	4.7	5.9	6.0	4.8	6.3	6.9	6.4	5.8	5.1	5.8
	1.08	0.76	1.02	1.23	1.19	1.04	1.26	1.87	2.36	2.81	2.09	1.64	1.57
100	3.8	1.6	3.1	5.6	6.9	6.9	5.7	7.5	8.3	7.7	7.0	6.2	6.9
	1.22	0.85	1.15	1.31	1.22	1.06	1.35	2.06	2.64	3.20	2.38	1.87	1.70
200	4.5	1.9	3.7	6.5	8.0	7.9	6.7	8.9	9.9	9.4	8.6	7.6	8.3
	1.18	0.83	1.11	1.33	1.25	1.09	1.36	2.04	2.58	3.09	2.29	1.80	1.74
Freq	3.9	2.5	2.7	4.5	6.1	5.9	5.4	8.4	18.0	22.3	13.1	7.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.8	498	4.8	204	4.2	134	3.3	64
25	7.4	634	5.7	317	5.1	231	4.3	137
50	8.0	758	6.5	431	6.0	331	5.2	218
100	8.6	951	7.6	618	7.0	482	6.2	333
200	9.4	1265	9.2	1071	8.4	825	7.4	558

Thessaloniki

40° 31′ 00″ N 22° 58′ 00″ E	UTM 34 E 666614 m N 4487040 m	8 m a.s.l.

Location in the airport of the city of Thessaloniki. The terrain is flat around the station and there are no trees within 500 m. To the NE at a distance of 8 km there is a 1200-m high mountain (Hortiatis) and 7 km to the S there are hills reaching up to about 200 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.10	3000	0.20							-6	-7
30	0.03	800	0.10									-15	-1
60	0.03	400	0.10									-10	6
90	0.03	300	0.10									2	6
120	0.03	300	0.10									9	1
150	0.03	300	0.10									5	-5
180	0.03	400	0.10									-6	-7
210	0.03	600	0.10									-15	-1
240	0.03	1200	0.10									-10	6
270	0.03	2200	0.02	2700	0.00							1	5
300	0.03	2200	0.00									7	1
330	0.03	2200	0.00									4	-4

Height of anemometer: 10.0 m a.g.l. Period: 74010100–83123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.6	290	28	90	86	90	70	65	65	44	82	46	27	10	6	5.5	1.35
30	3.3	803	26	75	33	25	16	7	4	4	6	1	0	0	0	0.5	0.56
60	3.6	712	59	108	61	27	10	5	9	5	3	1	0	0	0	0.9	0.72
90	14.5	203	169	383	150	48	20	10	6	5	5	0	0	0	0	2.8	1.81
120	9.6	290	143	274	137	54	34	20	19	10	12	4	2	0	0	2.8	1.28
150	5.9	453	72	149	82	59	49	40	42	20	26	4	4	0	0	2.7	1.04
180	8.4	338	28	101	102	107	104	81	69	33	30	4	1	1	0	4.3	1.58
210	5.2	549	36	80	86	75	48	51	39	19	12	3	1	0	1	2.5	1.02
240	4.8	577	26	90	84	77	47	44	29	14	9	1	2	0	0	2.3	1.00
270	8.7	318	69	176	149	101	75	43	32	11	17	5	1	2	0	3.4	1.37
300	13.3	212	37	143	139	121	82	52	52	26	49	26	24	16	21	4.9	1.14
330	13.2	233	30	88	97	85	70	57	69	48	82	50	40	18	33	6.3	1.31
Total	100.0	335	68	169	113	79	57	42	40	23	34	16	12	6	8	3.5	1.04

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.6	3.1	2.3	2.1	1.5	2.1	2.8	1.8	2.0	2.4	2.8	2.9	2.4
3	3.4	3.0	1.9	2.1	1.4	2.0	2.6	1.7	1.8	2.3	2.8	3.0	2.3
6	3.2	2.7	1.9	1.9	1.4	2.3	3.2	1.9	1.6	1.8	2.5	2.9	2.3
9	3.7	3.7	3.6	4.1	4.0	4.9	5.9	4.8	4.4	3.6	3.4	3.2	4.1
12	5.1	4.6	4.5	4.9	5.0	5.6	6.6	5.7	5.5	4.4	4.4	4.2	5.1
15	4.5	4.3	4.6	4.9	5.3	6.1	6.7	6.0	5.2	3.8	3.2	3.6	4.9
18	3.7	3.1	2.8	2.5	2.3	3.4	4.3	3.0	2.4	2.0	2.8	3.4	3.0
21	3.4	3.2	2.4	2.3	1.8	2.0	2.7	1.8	2.2	2.4	3.1	3.4	2.5
Day	3.8	3.5	3.0	3.1	2.8	3.5	4.4	3.3	3.1	2.8	3.1	3.3	3.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.9	5.5	3.8	4.4	4.3	4.2	6.5	5.8	4.8	4.4	5.3	6.8	5.4
	1.37	1.00	1.21	1.94	1.64	1.29	1.62	1.39	1.29	1.20	1.13	1.23	1.16
25	9.7	6.0	4.2	4.8	4.7	4.7	7.1	6.3	5.3	4.9	5.9	7.4	5.9
	1.38	1.01	1.24	2.00	1.69	1.33	1.66	1.42	1.33	1.24	1.15	1.24	1.18
50	10.3	6.4	4.5	5.2	5.1	5.0	7.6	6.8	5.7	5.3	6.3	7.9	6.4
	1.40	1.02	1.27	2.05	1.74	1.36	1.71	1.46	1.37	1.27	1.17	1.26	1.20
100	11.0	6.8	4.8	5.6	5.5	5.4	8.2	7.3	6.2	5.7	6.7	8.5	6.8
	1.40	1.02	1.23	1.99	1.68	1.32	1.66	1.43	1.32	1.23	1.15	1.25	1.20
200	11.7	7.3	5.3	6.2	6.1	5.9	9.0	8.0	6.7	6.2	7.2	9.1	7.4
	1.38	1.01	1.17	1.88	1.60	1.25	1.58	1.37	1.26	1.17	1.12	1.23	1.18
Freq	10.7	6.3	5.9	11.0	9.2	6.0	7.6	7.1	6.3	7.9	10.6	11.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	2.2	2.5	3.0	2.9	2.8	4.8	3.6	3.2	3.0	3.8	5.1	3.7
	1.31	0.74	1.19	1.62	1.27	1.05	1.47	1.10	1.11	1.04	1.01	1.17	1.04
25	7.8	2.6	3.0	3.6	3.5	3.5	5.7	4.3	3.8	3.7	4.5	6.0	4.4
	1.34	0.76	1.28	1.75	1.37	1.13	1.57	1.16	1.19	1.12	1.05	1.21	1.09
50	8.7	2.9	3.6	4.2	4.1	4.2	6.6	5.0	4.6	4.3	5.2	6.8	5.1
	1.37	0.77	1.44	1.97	1.54	1.26	1.74	1.26	1.33	1.24	1.12	1.26	1.15
100	9.8	3.4	4.3	5.0	4.9	5.0	7.8	5.9	5.5	5.2	6.1	7.8	6.0
	1.43	0.81	1.52	2.10	1.64	1.34	1.86	1.35	1.41	1.32	1.19	1.35	1.24
200	10.9	3.8	5.3	6.3	6.1	6.2	9.6	7.1	6.8	6.4	7.1	8.9	7.2
	1.42	0.80	1.46	2.00	1.56	1.28	1.78	1.30	1.35	1.26	1.16	1.31	1.25
Freq	10.5	5.0	6.3	12.7	7.9	5.4	8.3	6.7	6.1	8.6	11.2	11.5	100.0

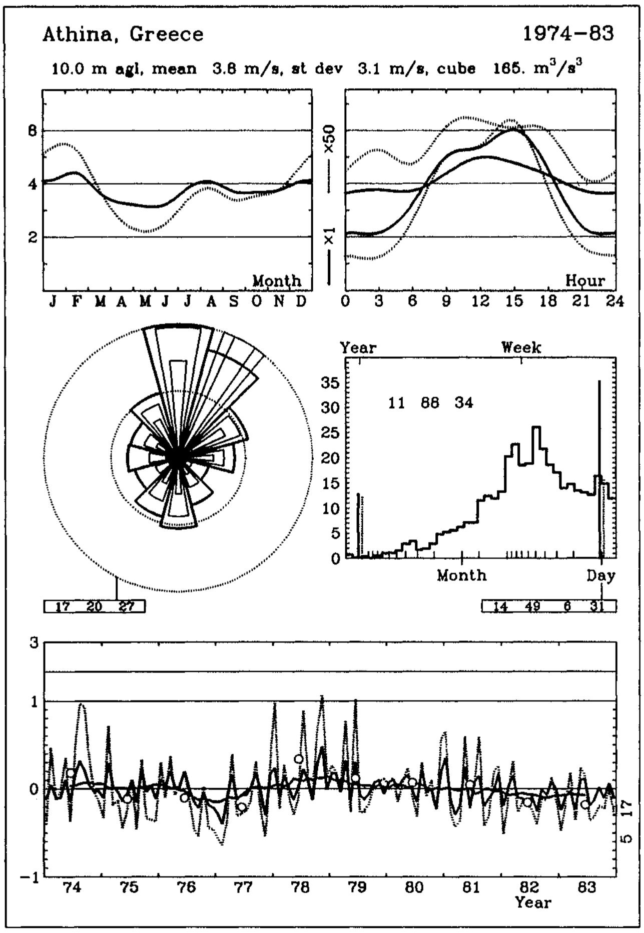
Roughness Class 2

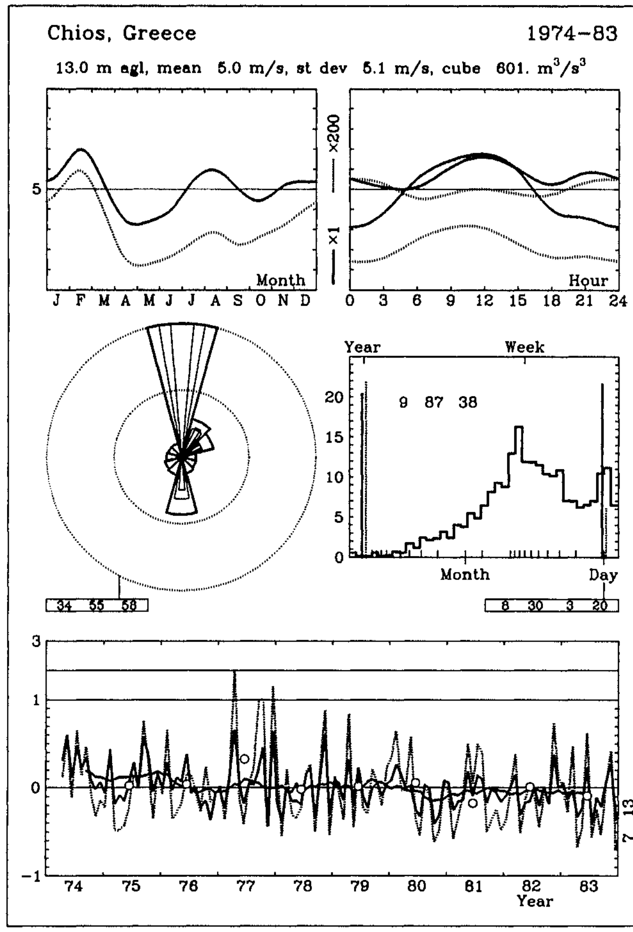
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	1.8	2.3	2.7	2.6	2.7	4.1	3.0	2.8	2.7	3.4	4.5	3.3
	1.30	0.74	1.33	1.70	1.28	1.10	1.46	1.09	1.13	1.03	1.04	1.19	1.06
25	6.9	2.2	2.9	3.4	3.2	3.4	5.1	3.8	3.5	3.4	4.2	5.5	4.0
	1.32	0.76	1.42	1.82	1.37	1.17	1.54	1.15	1.20	1.10	1.07	1.21	1.10
50	7.9	2.6	3.5	4.0	3.8	4.0	6.0	4.5	4.2	4.1	4.9	6.4	4.7
	1.35	0.77	1.57	2.01	1.51	1.28	1.69	1.23	1.32	1.21	1.13	1.26	1.15
100	9.0	3.0	4.2	4.7	4.6	4.9	7.1	5.3	5.0	4.9	5.8	7.4	5.6
	1.40	0.81	1.73	2.21	1.65	1.40	1.86	1.34	1.45	1.31	1.22	1.34	1.24
200	10.1	3.4	5.1	5.8	5.6	6.0	8.7	6.4	6.2	6.0	6.8	8.4	6.7
	1.41	0.81	1.65	2.11	1.58	1.35	1.78	1.29	1.38	1.26	1.19	1.33	1.26
Freq	10.3	5.0	6.9	12.3	7.5	5.5	8.3	6.7	6.4	8.8	11.2	11.1	100.0

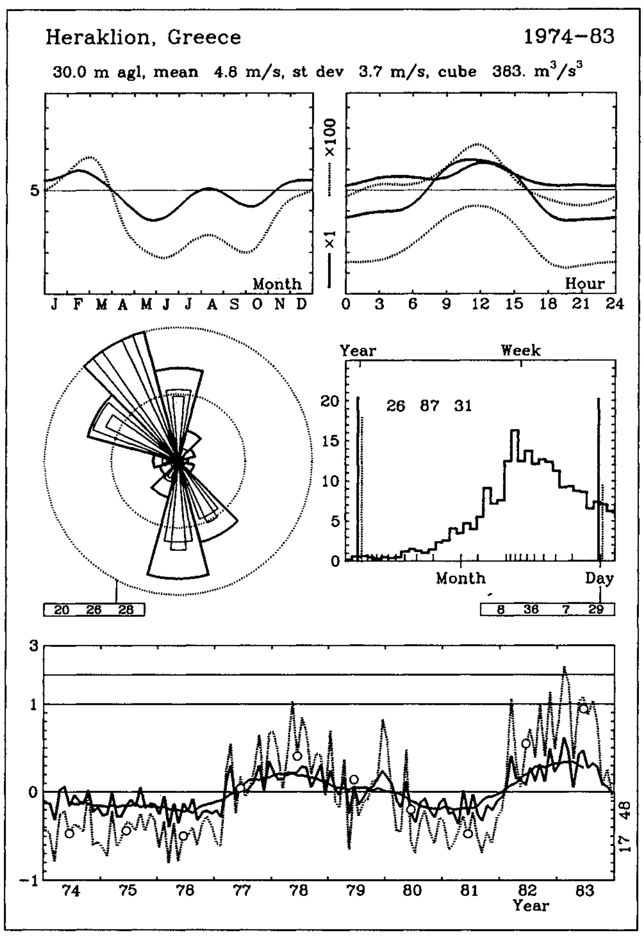
Roughness Class 3

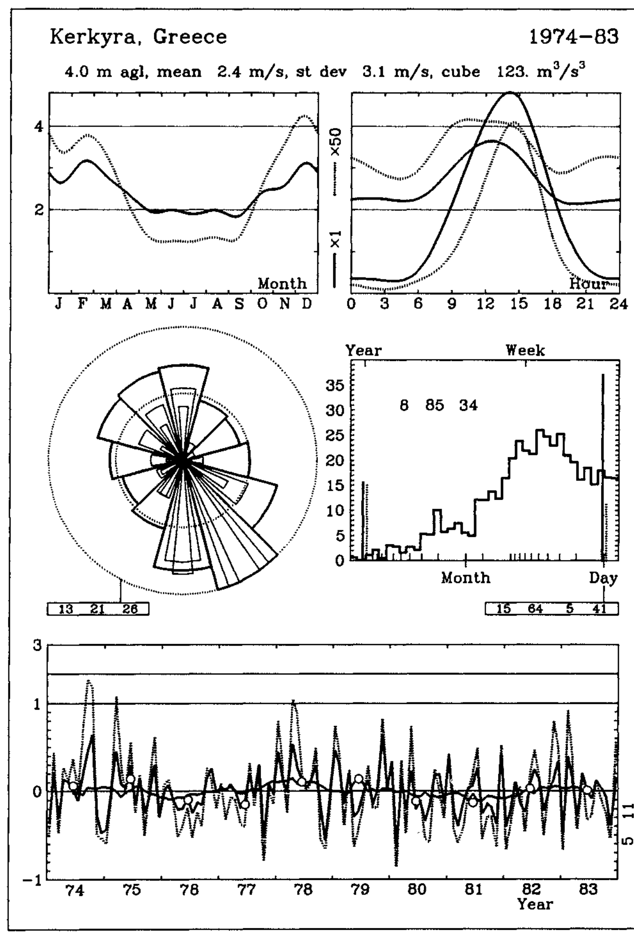
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	1.5	1.8	2.0	1.9	2.3	3.2	2.4	2.2	2.2	2.8	3.7	2.5
	1.27	0.77	1.33	1.51	1.17	1.13	1.42	1.10	1.16	1.02	1.04	1.20	1.05
25	5.6	1.9	2.4	2.7	2.5	3.0	4.2	3.2	3.0	2.9	3.6	4.8	3.3
	1.29	0.79	1.40	1.60	1.24	1.20	1.49	1.15	1.23	1.08	1.07	1.22	1.08
50	6.6	2.3	3.0	3.3	3.1	3.7	5.1	3.9	3.6	3.6	4.3	5.7	4.0
	1.31	0.81	1.52	1.74	1.35	1.29	1.61	1.22	1.33	1.17	1.11	1.26	1.13
100	7.7	2.8	3.6	4.0	3.8	4.6	6.1	4.7	4.5	4.5	5.2	6.7	4.9
	1.35	0.85	1.73	1.98	1.52	1.47	1.82	1.36	1.50	1.32	1.19	1.32	1.22
200	8.9	3.3	4.4	4.8	4.7	5.6	7.4	5.6	5.4	5.5	6.1	7.8	5.9
	1.39	0.86	1.67	1.91	1.47	1.42	1.76	1.33	1.45	1.27	1.19	1.34	1.24
Freq	9.6	5.2	7.7	11.7	7.2	5.9	8.1	6.6	6.7	9.1	11.2	11.0	100.0

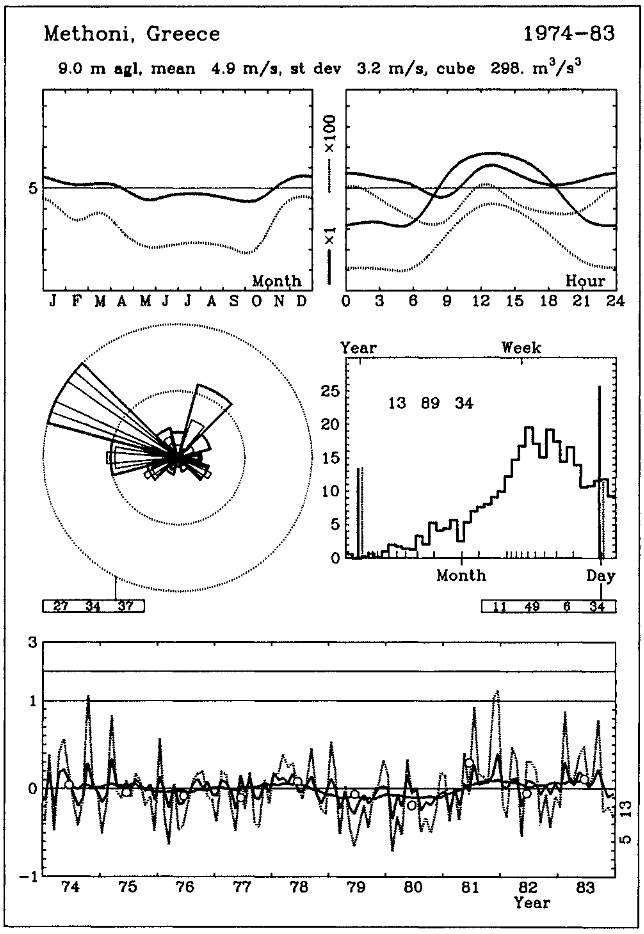
z	Class 0		Class 1		Class 2		Class 3	
10	5.1	357	3.6	157	3.2	102	2.5	49
25	5.6	448	4.3	237	3.9	174	3.2	103
50	6.0	527	4.9	310	4.5	240	3.9	160
100	6.4	658	5.6	414	5.2	328	4.6	230
200	7.0	871	6.7	689	6.2	542	5.5	373

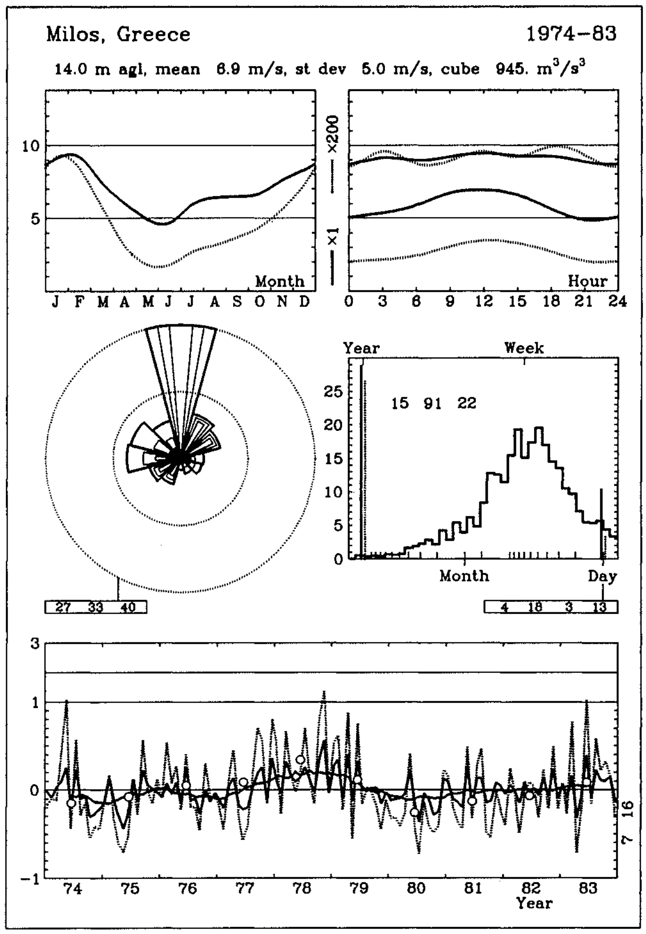

Athina, Greece
1974–83
10.0 m agl, mean 3.8 m/s, st dev 3.1 m/s, cube 165. m³/s³
×50
×1
Month
Hour
Year
Week
11 88 34
Month
Day
17 20 27
14 49 6 31
Year
5 17

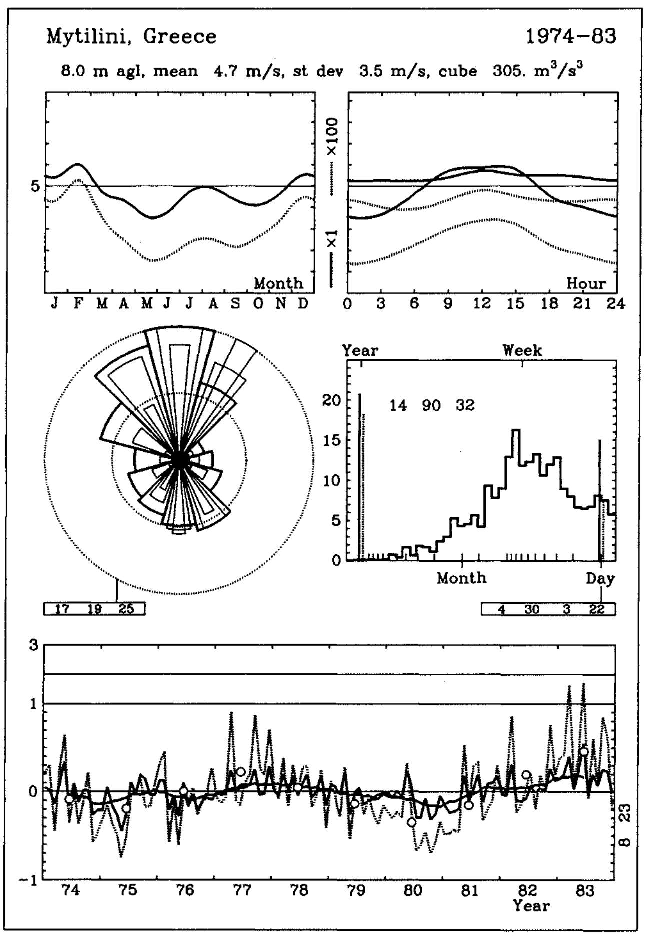

Chios, Greece
1974–83
13.0 m agl, mean 5.0 m/s, st dev 5.1 m/s, cube 601. m³/s³
×200
×1
Month
Hour
Year
Week
9 87 38
Month
Day
34 55 58
8 30 3 20
Year
7 13

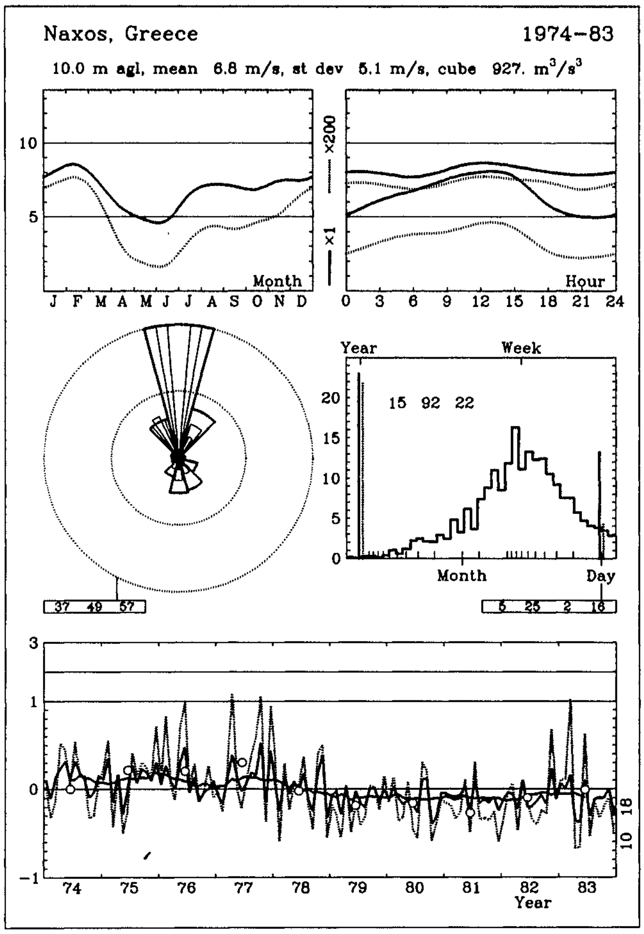

Heraklion, Greece
1974–83
30.0 m agl, mean 4.8 m/s, st dev 3.7 m/s, cube 383. m³/s³
×100
×1
Month
Hour
Year
Week
26 87 31
Month
Day
20 26 28
8 36 7 29
Year
17 48

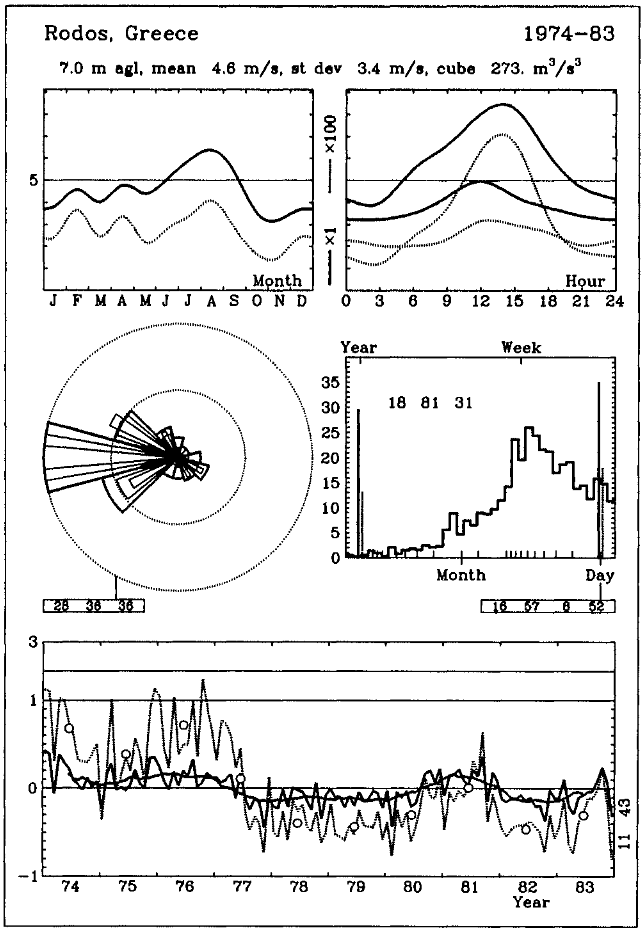

Kerkyra, Greece
1974–83
4.0 m agl, mean 2.4 m/s, st dev 3.1 m/s, cube 123. m³/s³
×50
×1
Month
Hour
Year
Week
8 85 34
Month
Day
13 21 26
15 64 5 41
Year
5 11

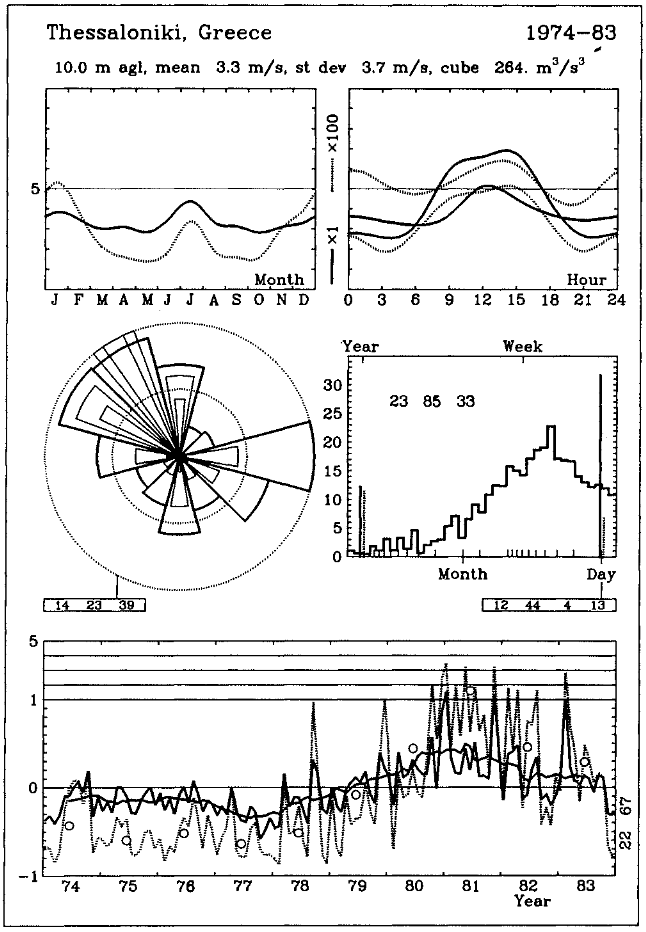

Methoni, Greece
1974–83
9.0 m agl, mean 4.9 m/s, st dev 3.2 m/s, cube 298. m³/s³
Month
Hour
Year
Week
13 89 34
Month
Day
27 34 37
11 49 6 34
5 13
Year


Milos, Greece
1974–83
14.0 m agl, mean 6.9 m/s, st dev 5.0 m/s, cube 945. m³/s³
Month
Hour
Year
Week
15 91 22
Month
Day
27 33 40
4 18 3 13
7 16
Year


Mytilini, Greece
1974–83
8.0 m agl, mean 4.7 m/s, st dev 3.5 m/s, cube 305. m³/s³
Month
Hour
Year
Week
14 90 32
Month
Day
17 19 25
4 30 3 22
8 23
Year


Naxos, Greece
1974–83
10.0 m agl, mean 6.8 m/s, st dev 5.1 m/s, cube 927. m³/s³
Month
Hour
×200
×1
Year
Week
15 92 22
Month
Day
37 49 57
5 25 2 16
10 18
Year


Rodos, Greece
1974–83
7.0 m agl, mean 4.6 m/s, st dev 3.4 m/s, cube 273. m³/s³
Month
Hour
×100
×1
Year
Week
18 81 31
Month
Day
28 36 36
16 57 8 52
11 43
Year


Thessaloniki, Greece
1974–83
10.0 m agl, mean 3.3 m/s, st dev 3.7 m/s, cube 264. m³/s³
Month
Hour
×100
×1
Year
Week
23 85 33
Month
Day
14 23 39
12 44 4 13
22 67
Year

Belmullet

54° 14′ 00″ N 10° 00′ 00″ W	UTM 29 E 434815 m N 6010074 m	9 m a.s.l.

Situated at the N end of Blacksod Bay, 3.5 km E of the Atlantic coastline and about 1 km WNW of the town of Belmullet. The long irregular promontory of The Mullet, on which the station stands, is almost an island, bounded on the N and W by the Atlantic Ocean, on the S by Blacksod Bay and on the E by Broad Haven. There are distant hills and mountains from 040°-205° and at 040°-080° there are isolated hills 10 km away. Elsewhere the 150-m contour line lies at least 20 km away. Up to 1976 the site was very well exposed with only a few buildings in the SE sector. The anemometer is placed above a 3 m high flat-roofed building with a horizontal diagonal dimension of 12 metres.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03											6	2
30	0.03											7	
60	0.03											5	-2
90	0.03	500	0.01	1200	0.05							-2	-2
120	0.03	500	0.00	1000	0.05							-12	
150	0.03	200	0.00									-10	2
180	0.03	100	0.00	650	0.05							3	1
210	0.03	100	0.00	550	0.05							6	
240	0.03	100	0.00	450	0.05							4	-2
270	0.01	400	0.05									1	-2
300	0.03											-2	
330	0.03											2	2

Height of anemometer: 12.0 m a.g.l. Period: 66010103–75123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.9	29	43	88	113	106	107	100	114	78	126	63	24	7	4	7.4	2.09
30	7.1	49	52	80	103	117	133	122	100	79	103	31	16	10	2	6.8	2.05
60	5.4	76	97	154	159	110	106	85	73	53	48	23	7	5	3	5.3	1.58
90	5.5	72	83	146	160	129	126	82	65	46	62	17	11	1	0	5.3	1.74
120	5.6	59	78	125	126	102	125	121	83	56	78	33	12	2	1	6.2	1.95
150	7.2	58	72	112	132	102	100	107	84	66	89	47	25	4	0	6.5	1.85
180	9.3	42	31	59	59	64	88	86	94	85	173	115	63	27	15	9.1	2.31
210	13.4	18	23	39	55	70	81	76	91	90	199	126	75	30	25	9.8	2.53
240	13.0	17	24	51	64	71	108	103	120	92	183	94	43	17	12	8.8	2.31
270	11.4	20	22	52	84	102	113	117	121	92	154	73	30	12	8	8.1	2.29
300	8.9	22	35	79	101	103	115	105	103	88	135	69	31	11	5	7.7	2.10
330	7.2	25	45	83	133	129	126	119	102	73	107	34	17	3	2	6.8	2.08
Total	100.0	35	44	79	97	95	108	101	99	79	135	70	35	13	8	7.7	2.01

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.3	7.0	6.5	5.5	5.6	5.2	5.0	4.7	5.6	7.2	6.9	7.4	6.2
3	7.5	7.1	6.5	5.4	5.6	5.1	5.1	4.6	5.8	7.1	7.0	7.6	6.2
6	7.6	7.0	6.5	5.5	5.6	5.2	5.4	4.7	5.7	7.0	7.2	7.8	6.3
9	7.4	7.0	6.8	6.4	6.8	6.2	6.4	5.8	6.3	7.3	7.3	7.9	6.8
12	7.7	7.8	7.9	7.5	7.7	7.1	7.1	6.5	7.3	8.0	7.6	8.0	7.5
15	7.9	7.9	8.1	7.7	7.9	7.4	7.4	6.8	7.5	8.0	7.4	8.1	7.7
18	7.4	7.1	7.5	7.3	7.5	6.9	6.7	6.2	6.5	7.4	6.9	7.6	7.1
21	7.5	7.0	6.7	5.9	5.9	5.6	5.4	5.0	5.8	7.2	6.7	7.4	6.3
Day	7.5	7.2	7.1	6.4	6.6	6.1	6.1	5.5	6.3	7.4	7.1	7.7	6.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.4	8.9	7.7	7.4	8.7	7.4	10.4	11.6	11.1	11.1	10.8	9.5	9.9
	2.36	2.36	2.03	2.00	2.12	1.83	2.39	2.74	2.60	2.53	2.37	2.31	2.25
25	10.3	9.7	8.4	8.1	9.5	8.2	11.3	12.6	12.1	12.0	11.7	10.4	10.8
	2.41	2.42	2.09	2.06	2.17	1.88	2.43	2.78	2.65	2.57	2.40	2.35	2.29
50	11.0	10.4	9.0	8.8	10.2	8.8	12.1	13.4	12.9	12.8	12.5	11.1	11.5
	2.48	2.49	2.15	2.12	2.23	1.94	2.50	2.85	2.71	2.63	2.46	2.42	2.35
100	11.8	11.3	9.8	9.5	10.9	9.5	12.9	14.4	13.8	13.7	13.4	11.9	12.4
	2.42	2.42	2.08	2.05	2.18	1.88	2.45	2.81	2.67	2.60	2.43	2.37	2.32
200	12.9	12.4	10.8	10.5	11.9	10.5	14.0	15.5	14.9	14.8	14.4	13.0	13.5
	2.32	2.31	1.98	1.94	2.09	1.78	2.38	2.73	2.59	2.52	2.36	2.28	2.25
Freq	6.1	6.4	5.6	5.6	5.9	7.2	8.8	11.9	12.6	12.0	10.0	7.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	6.2	5.0	5.2	6.3	5.0	7.9	8.3	7.8	7.9	7.6	6.4	7.0
	2.06	2.04	1.58	1.70	1.89	1.54	2.30	2.49	2.28	2.26	2.08	2.05	2.00
25	7.9	7.3	6.0	6.3	7.5	6.0	9.3	9.8	9.2	9.3	8.9	7.7	8.3
	2.17	2.18	1.70	1.83	2.00	1.66	2.39	2.58	2.37	2.35	2.16	2.18	2.09
50	9.1	8.4	6.9	7.3	8.6	7.0	10.4	11.0	10.3	10.5	10.0	8.8	9.4
	2.35	2.42	1.91	2.06	2.17	1.86	2.53	2.73	2.51	2.48	2.29	2.38	2.24
100	10.4	9.9	8.2	8.6	9.9	8.3	11.9	12.5	11.8	11.9	11.4	10.2	10.8
	2.53	2.59	2.03	2.19	2.33	1.98	2.72	2.93	2.70	2.66	2.45	2.55	2.42
200	12.5	12.1	10.2	10.7	11.9	10.4	13.8	14.5	13.7	13.8	13.3	12.3	12.8
	2.44	2.48	1.94	2.10	2.24	1.89	2.64	2.84	2.62	2.58	2.38	2.45	2.37
Freq	5.7	6.6	5.3	5.7	6.1	7.5	9.1	12.6	12.6	11.9	9.5	7.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	5.3	4.4	4.6	5.4	4.6	6.9	7.2	6.8	6.9	6.6	5.6	6.1
	2.04	2.00	1.60	1.71	1.87	1.54	2.33	2.47	2.30	2.26	2.08	2.05	2.00
25	7.1	6.5	5.4	5.7	6.7	5.6	8.4	8.8	8.3	8.4	8.0	6.9	7.5
	2.14	2.13	1.71	1.83	1.97	1.64	2.41	2.56	2.38	2.33	2.15	2.16	2.08
50	8.2	7.6	6.4	6.7	7.7	6.6	9.6	10.0	9.5	9.6	9.1	8.0	8.6
	2.30	2.32	1.89	2.01	2.12	1.80	2.53	2.68	2.50	2.45	2.26	2.34	2.22
100	9.5	9.0	7.6	8.0	9.0	7.9	11.0	11.5	10.9	11.0	10.5	9.4	10.0
	2.52	2.56	2.07	2.21	2.33	1.98	2.76	2.92	2.73	2.67	2.46	2.57	2.42
200	11.4	10.9	9.4	9.8	10.8	9.6	12.9	13.4	12.7	12.8	12.2	11.3	11.8
	2.43	2.45	1.99	2.12	2.24	1.89	2.69	2.84	2.65	2.60	2.40	2.47	2.38
Freq	5.8	6.5	5.3	5.7	6.3	7.6	9.4	12.6	12.6	11.7	9.3	7.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	4.1	3.5	3.7	4.2	3.8	5.5	5.6	5.4	5.4	5.1	4.4	4.8
	2.04	1.96	1.62	1.73	1.85	1.59	2.37	2.46	2.31	2.24	2.07	2.06	2.01
25	5.9	5.4	4.6	4.9	5.4	5.0	7.1	7.3	7.0	7.0	6.6	5.8	6.3
	2.12	2.06	1.71	1.83	1.93	1.66	2.44	2.53	2.37	2.31	2.13	2.15	2.08
50	7.0	6.5	5.5	5.9	6.5	6.0	8.4	8.6	8.3	8.3	7.8	7.0	7.5
	2.26	2.22	1.86	1.97	2.05	1.77	2.54	2.63	2.48	2.40	2.22	2.29	2.19
100	8.3	7.7	6.7	7.1	7.8	7.2	9.9	10.1	9.7	9.7	9.2	8.3	8.8
	2.50	2.52	2.11	2.24	2.28	1.99	2.73	2.82	2.67	2.58	2.39	2.55	2.38
200	9.9	9.4	8.1	8.7	9.3	8.7	11.6	11.9	11.4	11.4	10.8	9.9	10.4
	2.46	2.44	2.04	2.16	2.24	1.94	2.75	2.85	2.69	2.60	2.41	2.51	2.39
Freq	5.9	6.4	5.4	5.7	6.5	7.7	9.9	12.7	12.4	11.4	9.1	6.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.8	707	6.2	281	5.4	185	4.3	89
25	9.6	904	7.3	443	6.6	324	5.5	192
50	10.2	1081	8.3	608	7.6	470	6.6	310
100	11.0	1352	9.6	873	8.8	683	7.8	477
200	11.9	1774	11.4	1472	10.5	1148	9.3	792

Claremorris

53° 43′ 00″ N 08° 59′ 00″ W	UTM 29 E 501099 m N 5952126 m	69 m a.s.l.

Situated in gently rolling countryside 1 km SSE of the small town of Claremorris. There are no hills higher than 150 m within 13 km. There are mountains, hills and higher ground in most directions beyond 13 km, but this does not seem to influence the measurements. The countryside is characterized by large areas of peat bogs, hedges, roads, railways, lakes and some small buildings. The anemometer is placed on a hut (3 × 3 × 3 m).

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	100	0.10										
30	0.05	250	0.10										
60	0.05	250	0.10										
90	0.05	150	0.10										
120	0.05	100	0.20										
150	0.05	100	0.30										
180	0.05	350	0.30										
210	0.05	350	0.30										
240	0.05	300	0.30										
270	0.05	350	0.30										
300	0.05	1000	0.30										
330	0.05	100	0.30									-2	

Height of anemometer: 12.0 m a.g.l. Period: 67080103-77073124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.0	181	106	157	167	117	102	71	51	23	21	4	2	0	0	4.2	1.64
30	3.7	232	142	177	140	87	88	48	39	21	12	9	3	2	0	3.6	1.32
60	5.1	187	150	164	139	128	91	59	38	19	21	3	0	0	0	3.9	1.58
90	6.6	174	119	160	127	116	99	77	56	30	31	7	4	1	0	4.4	1.56
120	6.7	154	120	145	145	109	115	81	62	28	33	5	3	0	0	4.5	1.66
150	8.4	153	106	152	142	114	112	89	55	29	39	9	0	0	0	4.5	1.68
180	10.1	122	112	146	150	106	116	91	71	37	33	12	3	0	0	4.8	1.71
210	14.0	90	70	114	134	128	121	102	84	60	63	23	9	1	0	5.7	1.90
240	9.4	119	77	120	146	107	114	109	77	53	51	19	6	2	0	5.4	1.81
270	12.2	107	86	114	127	104	114	97	88	63	64	26	9	2	1	5.8	1.83
300	10.2	157	132	185	128	102	85	77	53	29	37	11	3	0	0	4.2	1.46
330	7.6	179	130	151	152	117	93	76	47	19	25	10	0	0	0	4.1	1.59
Total	100.0	142	106	144	140	112	107	86	65	39	41	14	4	1	0	4.8	1.64

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.8	4.0	3.8	3.4	2.9	2.9	2.2	2.3	3.1	4.3	3.9	4.3	3.5
3	4.7	4.0	3.8	3.2	3.0	2.6	2.3	2.3	3.0	4.1	4.0	4.3	3.4
6	4.8	4.0	3.9	3.2	3.2	2.7	2.2	2.3	3.1	4.0	4.1	4.3	3.5
9	4.8	4.1	4.3	4.3	4.6	4.1	3.6	3.4	3.8	4.2	4.2	4.3	4.1
12	5.0	4.9	5.9	5.6	5.4	4.9	4.4	4.3	5.0	5.6	4.9	4.7	5.1
15	5.4	5.3	6.3	6.0	5.6	5.2	4.6	4.5	5.2	5.8	4.9	4.8	5.3
18	4.7	4.2	5.2	5.3	5.2	4.9	4.4	3.9	4.1	4.5	4.1	4.4	4.6
21	4.6	3.9	3.9	3.7	3.3	3.5	2.9	2.6	3.1	4.2	4.0	4.5	3.7
Day	4.8	4.3	4.6	4.4	4.2	3.9	3.3	3.2	3.8	4.6	4.2	4.5	4.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.1	6.2	6.0	6.7	7.4	8.3	8.3	9.2	9.4	9.5	7.9	7.3	8.1
	1.84	1.73	1.76	1.83	1.87	1.90	1.95	2.05	2.05	2.01	1.77	1.72	1.83
25	7.8	6.8	6.6	7.4	8.1	9.0	9.0	10.1	10.2	10.4	8.7	7.9	8.8
	1.89	1.78	1.82	1.88	1.92	1.94	1.99	2.09	2.09	2.05	1.81	1.76	1.87
50	8.4	7.3	7.1	7.9	8.7	9.6	9.6	10.7	10.9	11.1	9.3	8.5	9.5
	1.94	1.83	1.87	1.94	1.97	1.99	2.05	2.15	2.14	2.10	1.86	1.81	1.92
100	9.1	7.8	7.7	8.6	9.4	10.4	10.4	11.5	11.7	11.9	9.9	9.1	10.2
	1.89	1.77	1.81	1.87	1.91	1.95	2.00	2.10	2.10	2.07	1.82	1.76	1.89
200	10.0	8.6	8.5	9.4	10.4	11.3	11.3	12.5	12.6	12.8	10.8	10.0	11.1
	1.79	1.67	1.71	1.77	1.82	1.88	1.92	2.03	2.04	2.01	1.75	1.69	1.83
Freq	6.7	4.6	4.5	6.0	6.7	7.7	9.5	12.6	11.2	11.1	10.9	8.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.1	4.2	4.7	5.3	5.9	5.7	6.7	6.6	6.8	5.0	5.3	5.7
	1.58	1.37	1.54	1.54	1.63	1.66	1.68	1.85	1.80	1.80	1.49	1.54	1.62
25	5.7	4.9	5.1	5.7	6.4	7.0	6.8	7.9	7.8	8.0	6.0	6.3	6.8
	1.71	1.48	1.65	1.66	1.73	1.75	1.77	1.93	1.88	1.87	1.58	1.62	1.70
50	6.6	5.7	5.9	6.7	7.4	8.0	7.8	9.0	8.8	9.1	6.9	7.3	7.7
	1.92	1.65	1.86	1.87	1.91	1.88	1.93	2.06	2.01	1.99	1.73	1.76	1.84
100	7.9	6.8	7.0	7.9	8.6	9.2	9.0	10.3	10.1	10.4	8.1	8.5	9.0
	2.04	1.76	1.98	1.99	2.05	2.03	2.08	2.21	2.16	2.13	1.85	1.89	1.97
200	9.8	8.5	8.7	9.8	10.5	10.9	10.9	12.1	11.9	12.1	9.8	10.2	10.8
	1.95	1.68	1.89	1.90	1.96	1.95	1.99	2.14	2.09	2.07	1.77	1.82	1.93
Freq	6.4	4.1	4.9	6.4	6.6	8.1	9.9	13.5	10.1	11.8	10.5	7.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	3.5	3.7	4.2	4.7	5.2	5.0	5.9	5.7	5.9	4.2	4.7	5.0
	1.61	1.33	1.55	1.54	1.64	1.69	1.69	1.87	1.79	1.80	1.46	1.56	1.62
25	5.1	4.3	4.6	5.2	5.8	6.3	6.1	7.2	7.0	7.2	5.2	5.8	6.1
	1.72	1.42	1.65	1.65	1.73	1.76	1.78	1.94	1.86	1.86	1.54	1.64	1.69
50	6.0	5.1	5.4	6.1	6.8	7.3	7.1	8.3	8.0	8.3	6.1	6.8	7.1
	1.90	1.57	1.83	1.82	1.88	1.88	1.92	2.05	1.97	1.96	1.67	1.76	1.81
100	7.1	6.1	6.4	7.3	8.0	8.6	8.4	9.6	9.3	9.6	7.2	7.9	8.3
	2.09	1.73	2.01	2.00	2.06	2.06	2.11	2.24	2.15	2.13	1.84	1.93	1.98
200	8.8	7.6	7.9	9.0	9.7	10.2	10.0	11.2	10.9	11.2	8.8	9.5	9.9
	2.00	1.65	1.92	1.91	1.99	1.99	2.04	2.17	2.09	2.07	1.77	1.86	1.94
Freq	6.2	3.8	5.0	6.5	6.6	8.2	10.1	13.8	9.6	12.1	10.4	7.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.7	2.9	3.3	3.8	4.1	4.0	4.7	4.5	4.6	3.3	3.7	3.9
	1.60	1.35	1.57	1.56	1.67	1.69	1.73	1.88	1.80	1.78	1.46	1.58	1.63
25	4.2	3.6	3.9	4.4	5.0	5.3	5.2	6.1	5.9	6.0	4.3	4.9	5.1
	1.70	1.44	1.66	1.65	1.76	1.76	1.81	1.94	1.86	1.83	1.53	1.64	1.69
50	5.0	4.4	4.7	5.3	6.0	6.4	6.3	7.2	7.0	7.1	5.2	5.9	6.1
	1.85	1.55	1.80	1.79	1.88	1.86	1.92	2.03	1.95	1.91	1.65	1.74	1.79
100	6.1	5.4	5.7	6.5	7.2	7.6	7.5	8.5	8.2	8.4	6.3	7.0	7.3
	2.10	1.77	2.05	2.03	2.11	2.05	2.14	2.20	2.12	2.06	1.87	1.94	1.97
200	7.4	6.6	7.0	7.9	8.6	9.0	8.9	10.1	9.7	9.8	7.6	8.4	8.7
	2.02	1.70	1.98	1.96	2.05	2.03	2.10	2.21	2.12	2.07	1.80	1.90	1.96
Freq	5.8	3.8	5.2	6.5	6.8	8.6	10.4	13.7	9.6	12.2	9.8	7.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	476	5.1	197	4.4	130	3.5	63
25	7.8	605	6.0	307	5.4	225	4.6	134
50	8.4	720	6.9	414	6.3	322	5.5	214
100	9.0	914	8.0	597	7.3	466	6.5	323
200	9.8	1230	9.5	1054	8.8	815	7.7	554

Cork

51° 51′ 00″ N	08° 29′ 00″ W	UTM 29	E 535589 m	N 5744600 m	162 m a.s.l.

Location 17 km inland from the south coast with the centre of Cork City about 6 km to the N. The suburbs extend to within 2.5 km of the site. The airport lies on a long ridge extending almost due eastwards from a mountainous region of West Cork. The general elevation of the ridge is about 170 metres above sea level. About 30 km W and N of the site peaks of 600-400 metres occur. The anemometer is situated on the SW-facing slope of the highest crest in the locality. It is placed on a 3-m high hut and is well exposed in the sectors between 030°-260°. To the W the airport buildings lie 400 m upwind and the sectors W to NNE are obstructed by houses and trees. The countryside beyond the airfield is strongly undulating with local steep slopes.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05											-2	
30	0.03												
60	0.03												
90	0.03	500	0.20										
120	0.03	500	0.10										
150	0.03	500	0.10										
180	0.03	500	0.20										
210	0.03	1500	0.10										
240	0.05	400	0.40	500	0.03	1200	0.01						
270	0.10	300	0.40	400	0.03	1200	0.10						
300	0.10	400	0.40	500	0.03	1300	0.10						
330	0.03	200	0.10										

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.7	55	135	162	160	125	119	94	70	33	31	10	4	0	0	4.9	1.81
30	4.0	77	150	220	184	106	88	78	45	29	21	2	0	0	0	4.1	1.62
60	3.9	76	107	163	196	168	122	74	45	22	22	6	0	0	0	4.5	1.93
90	4.8	48	62	113	151	154	128	117	90	41	56	28	6	3	2	5.8	1.89
120	5.4	63	99	137	145	116	115	106	68	41	64	33	11	2	1	5.6	1.72
150	6.4	60	75	103	109	105	112	105	91	60	85	51	28	10	7	6.7	1.74
180	9.7	40	73	106	116	107	109	117	93	66	91	50	18	7	7	6.7	1.87
210	11.7	37	52	101	123	109	112	118	101	64	93	56	26	6	2	6.9	1.97
240	12.5	34	54	114	153	121	131	123	93	63	76	27	9	2	2	6.2	2.02
270	10.5	44	83	167	194	132	106	99	72	42	45	12	4	0	0	5.1	1.79
300	12.0	40	83	160	176	120	126	99	71	51	45	21	6	1	1	5.4	1.81
330	13.3	32	68	151	194	156	125	102	65	40	44	16	6	2	1	5.3	1.79
Total	100.0	45	79	137	158	126	118	106	79	50	60	28	11	3	2	5.7	1.76

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.1	5.4	5.1	4.4	3.9	3.6	3.5	3.5	4.1	4.9	5.1	5.5	4.6
3	6.1	5.5	5.1	4.3	3.9	3.6	3.6	3.4	4.2	4.9	5.2	5.8	4.6
6	5.9	5.5	5.2	4.3	4.0	3.6	3.6	3.4	4.1	4.9	5.2	5.9	4.6
9	5.9	5.5	5.5	5.3	5.1	4.6	4.4	4.0	4.7	5.1	5.3	5.9	5.1
12	6.4	6.3	6.9	6.1	5.6	5.0	5.0	4.7	5.7	6.2	5.9	6.2	5.8
15	6.8	6.6	7.0	6.3	5.7	5.3	5.2	5.0	5.8	6.1	6.1	6.4	6.0
18	6.2	5.6	6.1	5.6	5.3	5.1	4.9	4.5	5.0	5.0	5.1	5.9	5.4
21	6.0	5.3	5.1	4.3	4.0	3.8	3.7	3.5	4.0	4.8	5.1	5.7	4.6
Day	6.2	5.7	5.7	5.1	4.7	4.3	4.2	4.0	4.7	5.2	5.4	5.9	5.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	6.2	6.1	8.3	8.6	9.4	10.3	9.9	8.9	8.1	8.2	8.3	8.6
	2.10	1.94	2.13	1.99	2.01	1.87	1.99	2.13	2.25	2.19	2.06	2.05	1.98
25	8.5	6.8	6.7	9.1	9.4	10.3	11.2	10.8	9.7	8.9	9.0	9.1	9.4
	2.17	2.00	2.20	2.04	2.06	1.90	2.02	2.16	2.30	2.25	2.12	2.09	2.02
50	9.1	7.3	7.2	9.7	10.0	11.0	11.9	11.6	10.4	9.6	9.6	9.7	10.0
	2.23	2.05	2.26	2.10	2.11	1.94	2.06	2.22	2.37	2.31	2.18	2.15	2.07
100	9.9	7.9	7.8	10.5	10.8	11.7	12.7	12.4	11.2	10.4	10.4	10.5	10.8
	2.16	1.99	2.19	2.05	2.07	1.92	2.04	2.18	2.31	2.24	2.12	2.10	2.04
200	10.9	8.7	8.6	11.4	11.8	12.6	13.7	13.4	12.3	11.4	11.4	11.5	11.8
	2.05	1.88	2.07	1.97	1.99	1.87	1.99	2.12	2.21	2.13	2.03	2.01	1.98
Freq	8.1	4.5	4.0	4.5	5.2	6.1	8.7	11.1	12.3	11.0	11.6	12.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.0	4.4	6.3	5.9	7.0	7.4	7.0	6.1	5.5	5.8	5.8	6.0
	1.78	1.61	1.88	1.85	1.71	1.72	1.83	1.93	1.98	1.77	1.78	1.78	1.74
25	6.2	4.8	5.3	7.5	7.0	8.2	8.7	8.2	7.2	6.6	6.9	7.0	7.2
	1.93	1.74	2.04	1.95	1.80	1.77	1.88	2.01	2.12	1.91	1.89	1.89	1.83
50	7.2	5.6	6.1	8.5	8.0	9.2	9.8	9.3	8.3	7.7	8.0	8.0	8.2
	2.17	1.95	2.29	2.11	1.95	1.86	1.98	2.14	2.34	2.12	2.07	2.07	1.99
100	8.5	6.7	7.2	9.9	9.3	10.4	11.0	10.6	9.7	9.0	9.3	9.3	9.5
	2.31	2.08	2.44	2.27	2.10	1.99	2.12	2.30	2.51	2.27	2.22	2.22	2.15
200	10.6	8.3	9.0	11.8	11.1	12.0	12.7	12.5	11.9	11.1	11.3	11.3	11.4
	2.20	1.98	2.33	2.19	2.02	1.94	2.06	2.22	2.40	2.17	2.13	2.13	2.10
Freq	6.3	4.1	3.9	4.7	5.4	6.3	9.5	11.6	12.5	10.5	11.9	13.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	3.5	3.9	5.6	5.1	6.1	6.4	6.0	5.2	4.8	5.1	5.1	5.3
	1.78	1.64	1.91	1.85	1.70	1.74	1.84	1.93	1.99	1.77	1.78	1.77	1.74
25	5.4	4.3	4.8	6.8	6.3	7.4	7.8	7.3	6.4	5.9	6.3	6.3	6.4
	1.90	1.76	2.04	1.94	1.78	1.79	1.89	2.01	2.11	1.88	1.88	1.87	1.83
50	6.4	5.1	5.7	7.9	7.3	8.5	8.9	8.4	7.5	7.0	7.3	7.3	7.5
	2.10	1.94	2.26	2.07	1.90	1.87	1.97	2.12	2.31	2.07	2.03	2.03	1.96
100	7.6	6.1	6.8	9.1	8.5	9.8	10.2	9.8	8.9	8.3	8.6	8.5	8.8
	2.31	2.13	2.48	2.27	2.09	2.01	2.12	2.32	2.55	2.28	2.23	2.22	2.15
200	9.4	7.5	8.3	10.9	10.2	11.3	11.8	11.5	10.9	10.1	10.3	10.3	10.5
	2.21	2.04	2.38	2.20	2.02	1.98	2.08	2.25	2.44	2.18	2.15	2.14	2.11
Freq	5.7	4.0	3.9	4.8	5.4	6.4	9.8	11.8	12.4	10.5	12.0	13.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	2.8	3.2	4.3	4.2	4.8	5.0	4.7	4.1	3.8	4.0	4.0	4.1
	1.74	1.72	1.78	1.86	1.70	1.76	1.85	1.93	1.96	1.79	1.79	1.80	1.76
25	4.4	3.7	4.3	5.7	5.4	6.3	6.5	6.1	5.3	5.0	5.3	5.3	5.4
	1.84	1.82	1.89	1.94	1.77	1.80	1.90	1.99	2.06	1.88	1.87	1.89	1.83
50	5.4	4.5	5.2	6.8	6.5	7.4	7.7	7.2	6.4	6.1	6.3	6.3	6.5
	2.00	1.98	2.05	2.05	1.86	1.87	1.97	2.10	2.22	2.03	2.00	2.02	1.94
100	6.5	5.5	6.3	8.0	7.7	8.7	9.0	8.5	7.7	7.3	7.5	7.5	7.7
	2.28	2.26	2.34	2.26	2.04	1.99	2.09	2.28	2.53	2.31	2.24	2.26	2.13
200	7.9	6.7	7.6	9.6	9.1	10.2	10.5	10.1	9.4	8.8	9.1	9.1	9.2
	2.19	2.17	2.25	2.23	2.03	2.01	2.12	2.28	2.44	2.23	2.19	2.21	2.13
Freq	5.5	4.0	4.0	4.9	5.5	6.9	10.1	11.9	12.1	10.7	12.2	12.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.6	517	5.4	210	4.7	139	3.7	67
25	8.3	658	6.4	329	5.7	241	4.8	143
50	8.9	787	7.3	450	6.6	348	5.7	229
100	9.5	996	8.4	653	7.8	509	6.8	352
200	10.4	1336	10.1	1153	9.3	888	8.2	601

Dublin

53° 26′ 00″ N	06° 15′ 00″ W	UTM 29	E 682689 m	N 5924125 m	64 m a.s.l.

Situated 8.5 km N of the city centre of Dublin, with the suburbs extending to within 2.5 km of the site. The open sea lies 8 to 12 km away, between 040° and 150°. The Dublin/Wicklow mountains lie between 155° and 225°. The hills start about 18 km S of the airport and extend a further 60 km to the S. The highest peak rises to 930 m. The anemometer is well exposed except in the SSW where there is an enclosure with houses and trees. It is placed on top of a hut (3 × 3 × 3 m).

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1500	0.20										
30	0.01	1900	0.20									-3	
60	0.01	1000	0.20									-11	
90	0.01	1000	0.20										
120	0.01	1000	0.20										
150	0.01	500	0.20										
180	0.01	400	0.20									-7	
210	0.01	450	0.20									-9	
240	0.01	700	0.20										
270	0.01	800	0.20										
300	0.01	700	0.20										
330	0.01	1000	0.20										

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	2.8	198	106	134	128	87	87	91	66	32	36	26	9	1	0	4.6	1.42
30	4.4	154	113	113	141	113	106	68	55	40	63	30	5	0	0	4.9	1.55
60	5.6	106	95	138	147	145	111	98	58	42	40	14	6	1	0	5.0	1.77
90	5.7	128	108	167	143	112	99	85	53	40	41	15	8	1	0	4.7	1.54
120	7.1	110	118	148	160	124	109	76	50	25	44	23	11	1	0	4.8	1.52
150	9.3	79	75	119	149	118	128	116	75	38	58	28	11	4	1	5.7	1.81
180	4.6	121	90	103	124	111	115	101	86	55	70	21	3	0	0	5.6	1.90
210	10.3	65	52	88	114	118	132	128	110	66	86	32	7	2	0	6.5	2.21
240	18.4	43	41	78	114	119	121	124	111	74	110	44	14	5	1	6.9	2.18
270	17.3	44	51	90	136	121	139	116	92	69	85	38	13	4	0	6.5	2.01
300	9.3	66	77	113	165	150	132	108	69	44	49	18	8	2	0	5.5	1.87
330	5.2	124	92	114	122	116	129	118	63	49	45	17	9	2	0	5.4	1.85
Total	100.0	81	73	108	135	122	123	109	82	54	71	29	10	3	0	5.9	1.88

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.1	5.4	5.3	4.2	3.3	3.2	3.3	3.0	4.0	4.7	5.6	6.2	4.5
3	6.2	5.5	5.3	4.3	3.6	3.2	3.5	2.9	4.2	4.7	5.6	6.2	4.6
6	6.2	5.5	5.3	4.4	3.7	3.4	3.6	3.1	4.2	4.6	5.5	6.0	4.6
9	6.3	5.5	5.7	5.5	4.8	4.7	4.7	4.2	5.1	5.1	5.7	6.1	5.3
12	6.9	6.5	6.9	6.2	5.7	5.2	5.3	4.8	5.8	6.2	6.5	6.6	6.0
15	6.9	6.5	7.1	6.2	5.7	5.4	5.5	5.1	5.7	6.0	6.5	6.5	6.1
18	6.3	5.3	6.0	5.5	5.0	4.8	5.0	4.3	4.7	4.6	5.4	6.0	5.2
21	6.4	5.4	5.2	4.3	3.6	3.4	3.5	2.9	3.9	4.6	5.5	6.1	4.6
Day	6.4	5.7	5.9	5.1	4.4	4.1	4.3	3.8	4.7	5.1	5.8	6.2	5.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	7.1	7.8	7.4	6.9	8.1	8.7	10.4	10.2	9.5	8.6	7.9	8.8
	1.91	1.78	1.95	1.91	1.79	1.92	2.05	2.38	2.44	2.31	2.20	2.19	2.08
25	7.8	7.7	8.6	8.1	7.6	8.8	9.5	11.4	11.2	10.4	9.4	8.6	9.6
	1.97	1.83	2.01	1.97	1.85	1.97	2.09	2.42	2.49	2.36	2.26	2.25	2.13
50	8.4	8.3	9.2	8.6	8.2	9.5	10.2	12.1	11.9	11.1	10.1	9.3	10.2
	2.02	1.88	2.06	2.02	1.90	2.03	2.15	2.49	2.56	2.43	2.33	2.31	2.19
100	9.1	9.0	9.9	9.4	8.8	10.2	10.9	13.0	12.8	11.9	10.9	10.1	11.0
	1.96	1.83	2.01	1.96	1.84	1.98	2.10	2.45	2.51	2.38	2.26	2.24	2.14
200	10.1	9.8	10.9	10.3	9.7	11.1	11.9	14.1	13.9	13.0	11.9	11.1	12.0
	1.85	1.74	1.91	1.86	1.75	1.90	2.03	2.37	2.42	2.29	2.16	2.12	2.06
Freq	3.7	3.8	5.1	5.7	6.6	8.5	6.4	8.2	15.5	17.7	12.2	6.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.9	5.6	4.8	4.8	5.9	6.3	7.5	7.2	6.6	5.8	5.4	6.2
	1.48	1.53	1.72	1.56	1.51	1.74	1.83	2.16	2.15	1.99	1.85	1.83	1.82
25	5.6	5.9	6.7	5.8	5.7	7.0	7.5	8.9	8.5	7.8	6.9	6.5	7.3
	1.59	1.64	1.83	1.68	1.62	1.84	1.93	2.25	2.25	2.10	1.98	1.98	1.92
50	6.6	6.8	7.7	6.8	6.7	8.1	8.5	10.0	9.6	8.9	7.9	7.6	8.4
	1.78	1.82	2.01	1.88	1.81	1.99	2.08	2.39	2.41	2.27	2.20	2.22	2.08
100	7.8	8.1	9.0	8.1	7.9	9.3	9.9	11.4	11.0	10.3	9.3	9.0	9.7
	1.90	1.94	2.16	2.01	1.93	2.14	2.24	2.56	2.60	2.44	2.35	2.37	2.24
200	9.6	9.9	11.0	10.0	9.8	11.2	11.7	13.3	13.0	12.3	11.5	11.2	11.7
	1.81	1.86	2.07	1.92	1.85	2.06	2.15	2.49	2.51	2.35	2.25	2.26	2.18
Freq	3.1	4.2	5.4	5.7	6.9	9.0	5.2	9.5	17.5	17.4	10.3	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.3	4.9	4.2	4.2	5.2	5.6	6.6	6.2	5.7	4.9	4.7	5.4
	1.46	1.54	1.74	1.55	1.52	1.76	1.87	2.17	2.15	1.99	1.86	1.82	1.83
25	5.0	5.3	6.1	5.2	5.2	6.4	6.8	8.0	7.6	7.0	6.1	5.8	6.6
	1.55	1.63	1.85	1.66	1.62	1.85	1.96	2.25	2.24	2.09	1.98	1.95	1.92
50	5.9	6.3	7.1	6.1	6.1	7.4	7.9	9.2	8.7	8.1	7.2	6.9	7.7
	1.71	1.79	2.01	1.83	1.78	1.99	2.08	2.37	2.39	2.24	2.18	2.16	2.06
100	7.0	7.5	8.4	7.3	7.3	8.7	9.2	10.6	10.1	9.4	8.5	8.2	9.0
	1.88	1.97	2.20	2.01	1.96	2.18	2.29	2.59	2.62	2.45	2.39	2.37	2.26
200	8.6	9.1	10.1	9.0	9.0	10.4	10.9	12.4	12.0	11.3	10.4	10.1	10.8
	1.80	1.88	2.12	1.93	1.88	2.10	2.21	2.52	2.53	2.37	2.30	2.27	2.21
Freq	2.9	4.3	5.5	5.8	7.1	9.2	4.7	10.0	18.2	17.4	9.6	5.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.5	3.8	3.2	3.4	4.2	4.5	5.1	4.8	4.5	3.9	3.7	4.2
	1.45	1.56	1.74	1.53	1.52	1.79	1.92	2.17	2.14	1.98	1.86	1.79	1.83
25	4.2	4.6	5.1	4.3	4.4	5.4	5.9	6.7	6.3	5.8	5.1	4.9	5.5
	1.53	1.65	1.82	1.62	1.61	1.86	1.99	2.24	2.22	2.06	1.97	1.90	1.90
50	5.1	5.5	6.1	5.2	5.4	6.5	7.1	7.9	7.5	7.0	6.1	5.9	6.6
	1.65	1.77	1.95	1.76	1.73	1.98	2.10	2.34	2.34	2.18	2.13	2.06	2.02
100	6.2	6.6	7.3	6.3	6.5	7.7	8.4	9.3	8.9	8.3	7.4	7.1	7.9
	1.88	2.01	2.20	2.01	1.96	2.18	2.30	2.53	2.56	2.40	2.42	2.35	2.23
200	7.5	8.0	8.8	7.7	7.9	9.2	9.9	10.9	10.5	9.9	9.0	8.7	9.4
	1.81	1.94	2.14	1.93	1.90	2.15	2.29	2.54	2.55	2.38	2.33	2.27	2.22
Freq	3.0	4.4	5.7	5.8	7.2	8.8	5.0	11.2	18.3	16.6	8.9	5.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.8	526	5.5	212	4.8	140	3.8	68
25	8.5	672	6.5	333	5.8	244	4.9	145
50	9.1	803	7.4	457	6.8	354	5.9	234
100	9.8	1021	8.6	672	7.9	523	7.0	360
200	10.7	1376	10.4	1199	9.5	921	8.4	621

Kilkenny

52° 40′ 00″ N	07° 16′ 00″ W	UTM 29	E 617219 m	N 5836723 m	63 m a.s.l.

Location 2 km to the NW of the town centre of Kilkenny, the outskirts of the town being close in the SE quadrant. The region is surrounded by hills or mountains in all directions with the exception of the Nore Valley downstream. This river valley distorts the airflow so that winds blow preferentially from the NNW or from the S. The Celtic Sea lies 58 km to S and the Irish Sea 68 km to E. The mountain ranges, whose foothills are no more than 40 km away, have peaks reaching heights of 500-900 m. Between SSW and WSW the winds have already crossed several mountain ranges. Closer to the station the countryside is strongly rolling. The anemometer is above a 3-m high building with a horizontal diagonal dimension of 12 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	300	0.40										
30	0.03	300	0.40										
60	0.03	300	0.40										
90	0.03	300	0.40										
120	0.05	300	0.40										
150	0.40												
180	0.40												
210	0.03	300	0.40										
240	0.03	300	0.20										
270	0.20												
300	0.40	1000	0.20										
330	0.03	300	0.40										

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.3	300	215	187	118	71	50	34	14	5	6	1	0	0	0	2.6	1.30
30	3.3	388	154	118	113	99	63	35	17	9	4	0	0	0	0	2.6	1.26
60	3.2	366	183	175	127	78	45	12	11	2	1	0	0	0	0	2.4	1.37
90	4.4	335	208	187	133	75	35	15	6	6	1	0	0	0	0	2.4	1.39
120	5.5	320	181	183	136	72	60	25	16	3	4	1	0	0	0	2.7	1.37
150	9.8	248	161	158	151	94	80	42	31	14	18	4	0	0	0	3.4	1.41
180	12.7	196	148	151	133	112	98	65	36	26	25	7	2	1	0	4.0	1.48
210	11.4	170	158	181	146	111	96	62	34	17	20	5	1	0	1	3.8	1.49
240	8.7	169	147	176	173	113	101	60	28	14	17	2	0	0	0	3.8	1.65
270	9.4	142	111	164	194	147	107	57	33	20	17	6	1	0	0	4.2	1.77
300	9.8	143	125	174	167	127	118	64	39	19	17	5	2	0	0	4.2	1.71
330	12.6	200	194	199	153	96	66	42	23	11	14	2	1	0	0	3.3	1.40
Total	100.0	221	163	173	149	104	83	48	27	14	15	3	1	0	0	3.5	1.45

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.4	2.7	3.0	2.4	1.9	1.7	1.8	1.6	1.9	2.5	2.9	3.1	2.4
3	3.4	2.8	3.0	2.3	2.0	1.6	1.7	1.6	1.9	2.4	2.7	3.1	2.4
6	3.2	2.8	2.9	2.2	2.1	1.8	1.7	1.5	1.9	2.5	2.7	3.1	2.4
9	3.1	2.9	3.3	3.4	3.3	3.0	2.9	2.5	2.8	2.8	2.7	3.1	3.0
12	3.8	3.9	4.8	4.3	4.1	3.7	3.6	3.3	3.9	4.1	4.0	3.7	3.9
15	4.2	4.1	4.9	4.5	4.1	3.8	3.9	3.5	4.1	4.0	4.1	3.9	4.1
18	3.5	3.2	4.1	3.9	3.7	3.6	3.5	3.0	3.2	2.8	3.1	3.3	3.4
21	3.4	2.7	3.1	2.6	2.4	2.2	2.1	1.8	2.2	2.6	2.8	3.3	2.6
Day	3.5	3.2	3.6	3.2	3.0	2.7	2.6	2.4	2.7	3.0	3.1	3.3	3.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.5	4.4	4.3	4.7	6.3	7.4	7.2	6.4	6.9	7.6	6.7	6.3
	1.58	1.46	1.51	1.62	1.59	1.55	1.60	1.65	1.80	1.99	1.98	1.77	1.61
25	5.7	4.9	4.8	4.7	5.1	6.9	8.1	7.8	7.1	7.6	8.4	7.3	6.9
	1.63	1.51	1.56	1.67	1.64	1.60	1.63	1.69	1.86	2.05	2.04	1.83	1.65
50	6.2	5.3	5.2	5.1	5.5	7.4	8.7	8.4	7.6	8.1	9.0	7.9	7.4
	1.68	1.55	1.60	1.72	1.69	1.64	1.68	1.74	1.91	2.10	2.10	1.87	1.69
100	6.7	5.7	5.6	5.5	5.9	7.9	9.3	9.0	8.2	8.8	9.7	8.5	8.0
	1.62	1.50	1.55	1.66	1.63	1.60	1.65	1.70	1.85	2.04	2.03	1.81	1.65
200	7.3	6.3	6.2	6.1	6.5	8.7	10.1	9.8	9.1	9.7	10.7	9.4	8.8
	1.54	1.42	1.47	1.58	1.55	1.52	1.59	1.63	1.75	1.93	1.93	1.72	1.59
Freq	10.7	6.3	3.2	3.8	5.0	7.8	11.4	12.1	10.0	9.1	9.6	11.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.1	3.0	3.0	3.3	4.5	5.4	4.8	4.4	5.0	5.4	4.2	4.4
	1.30	1.24	1.31	1.37	1.34	1.37	1.44	1.45	1.57	1.72	1.68	1.43	1.40
25	4.1	3.8	3.6	3.6	4.0	5.4	6.4	5.8	5.3	6.0	6.5	5.1	5.2
	1.40	1.33	1.41	1.48	1.45	1.45	1.50	1.54	1.69	1.86	1.79	1.54	1.49
50	4.8	4.4	4.2	4.2	4.6	6.3	7.3	6.7	6.2	6.9	7.5	6.0	6.1
	1.57	1.49	1.58	1.65	1.62	1.59	1.60	1.70	1.90	2.09	1.98	1.73	1.63
100	5.7	5.3	5.0	5.0	5.5	7.4	8.4	7.8	7.3	8.2	8.8	7.1	7.2
	1.67	1.58	1.68	1.76	1.73	1.71	1.73	1.82	2.02	2.22	2.12	1.84	1.74
200	7.1	6.6	6.2	6.2	6.8	9.0	9.8	9.5	9.1	10.2	10.7	8.8	8.8
	1.60	1.51	1.60	1.68	1.65	1.63	1.67	1.74	1.93	2.12	2.03	1.76	1.69
Freq	9.9	4.6	3.2	4.1	5.3	8.8	12.1	11.8	9.3	9.2	9.6	12.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.7	2.6	2.6	2.9	4.0	4.7	4.1	3.8	4.4	4.8	3.6	3.8
	1.29	1.23	1.32	1.36	1.34	1.38	1.45	1.46	1.60	1.71	1.69	1.41	1.40
25	3.6	3.4	3.2	3.2	3.6	5.0	5.8	5.1	4.7	5.4	5.9	4.5	4.7
	1.37	1.31	1.40	1.46	1.43	1.46	1.51	1.55	1.72	1.83	1.79	1.50	1.48
50	4.3	4.1	3.8	3.8	4.3	5.8	6.7	6.0	5.6	6.4	6.9	5.3	5.6
	1.51	1.45	1.55	1.61	1.58	1.58	1.60	1.69	1.90	2.03	1.95	1.66	1.60
100	5.1	4.9	4.6	4.6	5.1	6.9	7.8	7.2	6.7	7.6	8.1	6.3	6.6
	1.66	1.59	1.70	1.76	1.73	1.73	1.74	1.86	2.08	2.23	2.14	1.82	1.75
200	6.3	6.0	5.6	5.6	6.3	8.4	9.2	8.7	8.2	9.4	9.8	7.8	8.0
	1.59	1.52	1.63	1.69	1.66	1.67	1.69	1.78	1.99	2.13	2.06	1.74	1.71
Freq	9.6	4.0	3.2	4.3	5.4	9.2	12.4	11.7	9.1	9.3	9.7	12.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.2	2.0	2.0	2.3	3.2	3.8	3.2	3.0	3.5	3.7	2.8	3.0
	1.28	1.25	1.35	1.37	1.35	1.40	1.47	1.49	1.63	1.75	1.69	1.42	1.41
25	2.9	2.9	2.7	2.7	3.1	4.3	4.9	4.3	4.0	4.6	4.9	3.7	4.0
	1.35	1.32	1.43	1.45	1.43	1.46	1.51	1.57	1.73	1.86	1.77	1.50	1.48
50	3.6	3.6	3.3	3.3	3.7	5.1	5.9	5.2	4.8	5.6	5.9	4.4	4.8
	1.46	1.43	1.54	1.57	1.54	1.56	1.59	1.70	1.87	2.01	1.90	1.63	1.58
100	4.4	4.4	4.0	4.0	4.6	6.2	7.0	6.3	5.8	6.8	7.1	5.4	5.8
	1.66	1.62	1.76	1.79	1.76	1.74	1.73	1.94	2.13	2.30	2.14	1.85	1.76
200	5.3	5.3	4.8	4.9	5.6	7.4	8.2	7.6	7.1	8.3	8.6	6.6	7.0
	1.60	1.56	1.69	1.73	1.69	1.70	1.73	1.87	2.05	2.21	2.08	1.78	1.73
Freq	9.1	3.3	3.2	4.4	5.5	9.8	12.8	11.4	8.6	9.3	10.0	12.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.6	270	4.0	116	3.5	77	2.7	37
25	6.2	342	4.7	178	4.3	131	3.6	78
50	6.6	408	5.4	239	5.0	186	4.3	124
100	7.2	532	6.4	357	5.9	276	5.2	187
200	7.9	745	7.9	685	7.2	516	6.3	340

Malin Head

55° 22′ 00″ N 07° 20′ 00″ W	UTM 29 E 605639 m N 6136993 m	24 m a.s.l.

Malin Head, the most northerly headland of Ireland is at the extremity of a narrow peninsula about 2 km wide, extending in a WNW to ENE line from the much larger Inishowen peninsula. The adjacent regions - within 100 km to the SW and S - are mostly mountainous. Close to the station the surrounding countryside is barren but not flat. The station is situated about 4 km to the E of Malin Head on a narrow ridge running SW-NE. The general WNW-ESE line of the coast is broken by a small 400-m wide cove facing NE, 150 m to the E of the station. The shore is generally rocky with steep inclines. Due to the height of the anemometer various buildings in the vicinity do not appear to seriously obstruct the airflow around the anemometer.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	350	0.00									7	2
30	0.03	270	0.00									9	
60	0.03	270	0.00									3	-2
90	0.05	150	0.00										-2
120	0.05											-2	
150	0.10	300	0.05									2	3
180	0.05											8	3
210	0.05	1900	0.00									10	
240	0.05	2500	0.00									8	-2
270	0.05	3200	0.00									2	-2
300	0.05	1200	0.00									1	
330	0.05	400	0.00									2	2

Height of anemometer: 21.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.5	22	22	46	58	53	69	76	80	76	159	135	89	47	68	10.6	2.22
30	3.5	41	35	82	80	87	85	87	85	59	117	106	86	28	23	8.6	1.87
60	4.1	58	68	128	137	118	95	63	69	46	84	53	43	22	16	6.3	1.39
90	7.4	34	39	61	83	85	93	99	97	91	137	73	50	19	41	8.6	1.82
120	6.7	25	25	38	53	64	100	103	109	85	151	109	64	40	35	9.4	2.04
150	9.8	15	24	42	95	97	117	110	103	81	130	84	57	27	17	8.4	1.96
180	12.7	23	27	61	104	81	85	86	76	82	152	113	67	25	16	8.9	2.15
210	11.7	20	20	57	70	67	83	92	90	76	182	117	74	30	22	9.5	2.29
240	11.2	10	9	20	29	49	74	98	109	98	191	145	91	46	31	10.4	2.53
270	11.7	11	9	16	35	53	88	106	109	111	203	122	72	35	31	10.0	2.44
300	8.9	17	14	30	52	69	117	119	95	87	144	104	75	44	35	9.4	2.04
330	6.8	26	29	53	79	74	89	105	100	69	141	99	75	32	33	9.0	1.91
Total	100.0	22	23	47	69	72	91	98	95	84	157	109	71	33	29	9.3	2.12

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	9.8	9.1	8.7	7.2	6.6	6.3	6.1	5.9	7.7	8.8	9.5	10.0	8.0
3	9.7	8.9	8.8	7.3	6.5	6.2	6.0	5.9	7.9	8.8	9.7	9.9	8.0
6	9.9	8.9	8.8	7.4	6.7	6.4	6.2	5.9	8.0	8.7	9.6	10.0	8.0
9	10.0	8.9	8.9	7.5	7.2	6.9	6.5	6.2	8.2	8.9	9.7	10.2	8.2
12	10.1	9.3	9.4	7.9	7.7	7.1	6.9	6.8	8.5	9.1	9.8	10.4	8.6
15	10.0	9.4	9.5	8.0	7.7	7.1	7.0	6.9	8.6	8.9	9.8	10.0	8.6
18	9.8	9.1	9.0	7.9	7.3	6.9	6.8	6.5	8.2	8.7	9.4	9.9	8.3
21	9.8	9.3	8.9	7.4	6.8	6.4	6.3	5.8	7.9	8.8	9.6	10.0	8.1
Day	9.9	9.1	9.0	7.6	7.1	6.7	6.5	6.2	8.1	8.8	9.6	10.1	8.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	7.6	6.0	7.9	11.8	10.7	10.6	9.4	10.6	11.0	9.9	8.5	9.9
	2.14	1.86	1.42	1.76	2.07	2.12	2.31	2.22	2.45	2.40	2.07	1.93	2.05
25	10.0	8.3	6.6	8.6	12.8	11.7	11.6	10.3	11.6	12.0	10.9	9.3	10.8
	2.19	1.92	1.46	1.80	2.09	2.15	2.35	2.26	2.49	2.44	2.10	1.98	2.08
50	10.7	8.9	7.1	9.3	13.6	12.5	12.3	11.0	12.3	12.8	11.6	10.0	11.5
	2.25	1.97	1.50	1.85	2.12	2.19	2.41	2.33	2.56	2.50	2.16	2.03	2.13
100	11.5	9.6	7.7	10.0	14.5	13.3	13.2	11.8	13.2	13.7	12.4	10.7	12.3
	2.20	1.90	1.46	1.80	2.12	2.17	2.37	2.28	2.51	2.47	2.12	1.98	2.11
200	12.5	10.6	8.4	10.9	15.5	14.3	14.2	12.9	14.3	14.8	13.4	11.7	13.3
	2.11	1.81	1.38	1.73	2.08	2.12	2.31	2.19	2.44	2.40	2.06	1.90	2.06
Freq	5.4	3.4	3.8	7.1	7.4	10.3	11.9	10.9	10.8	11.9	9.9	7.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.4	4.8	4.4	6.0	8.5	7.6	7.5	6.8	7.7	7.8	6.8	5.9	7.0
	1.85	1.45	1.27	1.53	1.97	1.94	2.09	2.01	2.20	2.13	1.79	1.70	1.85
25	7.6	5.8	5.3	7.1	10.0	8.9	8.8	8.0	9.0	9.2	8.1	7.1	8.3
	1.95	1.56	1.37	1.60	2.02	2.01	2.17	2.11	2.29	2.21	1.87	1.80	1.92
50	8.6	6.8	6.3	8.1	11.1	10.0	9.9	9.1	10.2	10.3	9.1	8.1	9.4
	2.12	1.76	1.52	1.71	2.09	2.11	2.31	2.28	2.44	2.34	1.98	1.96	2.04
100	10.0	8.1	7.4	9.3	12.5	11.3	11.3	10.6	11.6	11.7	10.4	9.5	10.7
	2.28	1.87	1.62	1.84	2.23	2.26	2.48	2.45	2.62	2.51	2.13	2.11	2.20
200	12.0	10.1	9.1	10.9	14.1	13.1	13.2	12.6	13.6	13.6	12.2	11.4	12.6
	2.19	1.79	1.55	1.77	2.18	2.20	2.40	2.37	2.53	2.44	2.06	2.03	2.15
Freq	4.9	3.4	4.5	7.2	8.0	10.8	11.9	10.6	10.9	11.8	9.3	6.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	4.1	4.0	5.4	7.3	6.6	6.5	6.0	6.7	6.7	5.9	5.2	6.1
	1.82	1.42	1.31	1.54	1.97	1.96	2.11	2.06	2.21	2.12	1.78	1.70	1.85
25	6.7	5.1	5.0	6.6	8.9	8.0	7.9	7.3	8.2	8.2	7.2	6.4	7.5
	1.92	1.51	1.40	1.60	2.01	2.02	2.19	2.15	2.29	2.19	1.85	1.78	1.92
50	7.8	6.1	5.9	7.6	10.1	9.2	9.1	8.5	9.4	9.4	8.3	7.4	8.6
	2.06	1.67	1.53	1.69	2.08	2.11	2.31	2.30	2.41	2.30	1.96	1.92	2.03
100	9.1	7.3	7.1	8.8	11.5	10.5	10.4	9.9	10.8	10.8	9.6	8.7	9.9
	2.26	1.84	1.68	1.84	2.20	2.29	2.52	2.52	2.63	2.51	2.13	2.11	2.21
200	10.9	9.0	8.6	10.3	13.1	12.2	12.2	11.7	12.6	12.6	11.3	10.5	11.7
	2.19	1.76	1.61	1.78	2.19	2.24	2.45	2.44	2.56	2.44	2.07	2.04	2.17
Freq	4.8	3.5	4.8	7.2	8.3	11.0	11.8	10.6	11.0	11.6	9.1	6.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.1	3.3	4.5	5.6	5.2	5.1	4.8	5.3	5.2	4.6	4.2	4.8
	1.79	1.37	1.38	1.58	1.94	1.99	2.13	2.09	2.20	2.08	1.77	1.74	1.86
25	5.6	4.2	4.4	5.9	7.3	6.7	6.6	6.3	6.9	6.8	6.0	5.5	6.3
	1.87	1.45	1.45	1.63	1.98	2.05	2.19	2.17	2.27	2.14	1.83	1.81	1.92
50	6.7	5.1	5.3	7.0	8.6	8.0	7.8	7.5	8.1	8.1	7.1	6.5	7.5
	1.99	1.57	1.56	1.69	2.03	2.12	2.30	2.29	2.37	2.23	1.92	1.93	2.01
100	7.9	6.2	6.4	8.2	10.0	9.3	9.2	8.9	9.6	9.4	8.4	7.8	8.8
	2.22	1.78	1.76	1.80	2.13	2.27	2.48	2.51	2.55	2.39	2.09	2.14	2.17
200	9.5	7.6	7.8	9.6	11.6	10.9	10.8	10.5	11.2	11.1	9.9	9.3	10.4
	2.18	1.72	1.71	1.82	2.17	2.30	2.49	2.49	2.57	2.41	2.09	2.11	2.19
Freq	4.5	3.6	5.2	7.1	8.7	11.2	11.6	10.6	11.2	11.3	8.8	6.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.7	763	6.2	308	5.4	203	4.3	98
25	9.5	973	7.3	481	6.6	352	5.6	209
50	10.2	1158	8.3	656	7.6	508	6.6	336
100	10.9	1443	9.5	917	8.8	723	7.8	510
200	11.8	1874	11.1	1513	10.3	1189	9.2	832

Mullingar

53° 32′ 00″ N 07° 21′ 00″ W	UTM 29 E 609363 m N 5932995 m	101 m a.s.l.

Situated in rolling countryside in the Central Plain of Ireland, about 1.7 km to the NW of the town centre. The Irish Sea lies more than 75 km away to the east. The nearest mountain range is 50 km away to the SSW. Its highest peak reaches 530 m a.s.l. In the other sectors the closest land above 300 metres is 70 km to the SE and NW/NNW and 85 km to the NE. The anemometer is situated above the roof of the station building which is 3-m high with a longest horizontal diagonal of 11 m. In the sectors from W through N to ENE there are several obstacles, mainly buildings. Behind these, there is open countryside. Lough Owel lies at a distance of about 2 km between 320° and 350°, with a further overwater fetch of about 5 km. From 165° through S to 265° the exposure of the station is good with open countryside.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30	100	0.05	500	0.15								
30	0.30	75	0.05	500	0.15								
60	0.30	75	0.05	500	0.15								
90	0.03	500	0.30	3000	0.15								
120	0.01	500	0.10	1000	0.30	3000	0.15						
150	0.01	500	0.15	1000	0.30	2000	0.15						
180	0.01	500	0.10	500	0.17								
210	0.01	120	0.05	500	0.15								
240	0.01	120	0.05	500	0.15								
270	0.01	120	0.05	500	0.15								
300	0.30	100	0.05	500	0.15								
330	0.30	100	0.05	500	0.15	2000	0.00						

Height of anemometer: 12.0 m a.g.l. Period: 74010106–83123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.7	143	108	165	178	137	125	73	46	17	6	1	0	0	0	4.2	1.95
30	3.6	210	107	126	143	133	101	87	52	31	10	0	0	0	0	4.2	1.81
60	6.0	157	100	143	166	142	120	87	48	23	11	2	0	0	0	4.4	1.94
90	6.5	149	87	110	151	151	155	90	57	22	20	8	2	0	0	4.8	2.03
120	4.8	145	56	108	146	131	137	114	63	42	37	16	3	0	0	5.3	1.96
150	7.9	92	35	66	111	119	154	158	97	73	67	22	7	0	0	6.4	2.44
180	10.2	71	41	85	123	136	145	144	118	64	51	16	3	1	0	6.1	2.46
210	11.9	83	45	82	132	140	163	144	98	60	39	13	1	0	0	5.9	2.52
240	13.1	71	40	61	108	132	171	164	111	65	55	17	4	1	0	6.3	2.62
270	12.8	73	47	77	132	126	157	156	96	63	51	17	4	1	0	6.1	2.46
300	10.0	100	80	152	192	149	127	102	45	24	22	5	1	0	0	4.7	1.95
330	7.4	123	86	139	179	145	129	101	56	25	15	3	0	0	0	4.6	2.00
Total	100.0	104	62	102	143	136	146	127	81	47	37	12	2	0	0	5.5	2.18

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.6	4.8	5.0	3.5	3.1	3.2	3.0	2.9	4.1	4.4	4.6	5.2	4.1
3	5.7	4.5	5.0	3.4	3.1	3.1	3.0	2.8	4.1	4.4	4.6	5.1	4.1
6	5.7	4.6	5.0	3.3	3.2	3.2	3.1	2.8	4.1	4.4	4.6	5.2	4.1
9	5.6	4.8	5.3	4.5	4.6	4.4	4.3	3.9	4.8	4.7	4.7	5.2	4.7
12	6.0	6.0	6.6	5.1	5.1	4.9	4.8	4.5	5.9	5.7	5.6	5.7	5.5
15	6.3	6.2	6.7	5.4	5.4	5.1	5.1	4.8	5.9	5.7	5.7	5.5	5.6
18	5.6	5.1	5.8	5.0	5.0	4.8	4.7	4.3	4.9	4.4	4.7	5.0	4.9
21	5.6	4.9	5.0	3.5	3.4	3.5	3.3	3.0	4.1	4.3	4.8	5.2	4.2
Day	5.8	5.1	5.5	4.2	4.1	4.0	3.9	3.6	4.7	4.8	4.9	5.3	4.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.4	6.6	6.9	7.4	7.7	9.2	9.3	9.2	9.7	9.7	8.2	6.2	8.4
	2.31	2.18	2.26	2.33	2.30	2.69	2.87	2.92	2.96	2.88	2.44	1.93	2.42
25	7.1	7.2	7.5	8.1	8.4	10.1	10.1	10.1	10.6	10.6	9.0	6.8	9.2
	2.38	2.24	2.33	2.40	2.37	2.77	2.95	3.01	3.05	2.96	2.52	1.99	2.49
50	7.6	7.7	8.1	8.7	9.1	10.8	10.9	10.8	11.3	11.3	9.7	7.3	9.9
	2.44	2.30	2.39	2.46	2.44	2.85	3.03	3.09	3.13	3.04	2.59	2.04	2.55
100	8.2	8.4	8.8	9.4	9.8	11.7	11.8	11.7	12.3	12.2	10.5	7.9	10.7
	2.37	2.23	2.31	2.38	2.36	2.76	2.94	2.99	3.04	2.96	2.51	1.98	2.48
200	9.1	9.3	9.7	10.4	10.9	12.9	13.0	13.0	13.5	13.4	11.6	8.8	11.8
	2.24	2.11	2.19	2.26	2.23	2.63	2.79	2.83	2.89	2.82	2.37	1.87	2.37
Freq	6.3	4.4	5.1	6.3	5.4	6.9	9.4	11.3	12.8	12.9	10.9	8.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.6	4.8	5.3	5.5	6.6	6.4	6.4	6.9	6.7	5.3	4.1	5.9
	1.91	1.78	1.90	1.98	1.92	2.35	2.39	2.43	2.54	2.40	1.96	1.64	2.08
25	5.5	5.5	5.7	6.3	6.5	7.9	7.7	7.7	8.2	8.0	6.4	5.0	7.0
	2.06	1.93	2.05	2.14	2.07	2.51	2.58	2.63	2.72	2.56	2.12	1.77	2.22
50	6.3	6.4	6.7	7.3	7.6	9.0	8.8	8.9	9.4	9.2	7.4	5.8	8.1
	2.32	2.17	2.30	2.40	2.33	2.78	2.89	2.95	3.00	2.83	2.38	1.99	2.45
100	7.5	7.6	7.9	8.6	9.0	10.6	10.4	10.5	11.0	10.7	8.8	6.9	9.5
	2.47	2.31	2.45	2.56	2.48	2.97	3.08	3.14	3.21	3.03	2.54	2.12	2.60
200	9.4	9.4	9.8	10.8	11.2	13.0	13.0	13.1	13.4	13.1	10.9	8.6	11.8
	2.36	2.20	2.34	2.44	2.37	2.85	2.94	3.00	3.08	2.91	2.42	2.03	2.51
Freq	5.8	3.8	5.8	6.5	5.0	7.6	10.0	11.7	13.0	12.8	10.2	7.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.0	4.2	4.6	4.8	5.8	5.6	5.6	6.1	5.9	4.5	3.6	5.1
	1.93	1.77	1.90	1.99	1.92	2.40	2.40	2.44	2.56	2.40	1.92	1.69	2.09
25	5.0	5.0	5.2	5.7	5.9	7.2	6.9	6.9	7.4	7.2	5.6	4.4	6.3
	2.06	1.90	2.04	2.13	2.05	2.55	2.57	2.60	2.71	2.55	2.05	1.81	2.21
50	5.8	5.9	6.1	6.7	6.9	8.3	8.0	8.1	8.6	8.4	6.5	5.2	7.4
	2.28	2.10	2.26	2.35	2.28	2.79	2.85	2.88	2.95	2.78	2.28	2.00	2.41
100	7.0	7.0	7.2	8.0	8.3	9.8	9.5	9.6	10.1	9.8	7.8	6.2	8.7
	2.51	2.31	2.48	2.59	2.50	3.06	3.13	3.17	3.24	3.06	2.50	2.20	2.62
200	8.6	8.6	8.9	9.9	10.2	11.9	11.8	11.9	12.3	12.0	9.6	7.7	10.7
	2.40	2.20	2.37	2.48	2.39	2.94	2.99	3.03	3.12	2.94	2.39	2.10	2.54
Freq	5.7	3.6	6.0	6.5	4.8	7.9	10.2	11.9	13.1	12.8	10.1	7.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.2	3.3	3.7	3.9	4.5	4.4	4.5	4.7	4.5	3.5	2.8	4.0
	1.90	1.79	1.91	2.00	2.00	2.38	2.40	2.45	2.57	2.33	1.92	1.69	2.09
25	4.2	4.2	4.4	4.8	5.2	5.9	5.8	5.8	6.2	5.9	4.6	3.7	5.3
	2.01	1.89	2.02	2.12	2.12	2.51	2.54	2.60	2.70	2.45	2.03	1.79	2.20
50	5.0	5.1	5.3	5.8	6.2	7.1	6.9	7.0	7.4	7.1	5.5	4.5	6.4
	2.19	2.06	2.20	2.30	2.30	2.70	2.76	2.81	2.90	2.64	2.20	1.95	2.37
100	6.1	6.1	6.4	7.0	7.5	8.5	8.3	8.4	8.9	8.4	6.7	5.5	7.7
	2.49	2.34	2.50	2.62	2.62	3.07	3.14	3.20	3.27	3.00	2.51	2.22	2.65
200	7.4	7.5	7.8	8.6	9.2	10.3	10.2	10.3	10.7	10.2	8.2	6.7	9.3
	2.40	2.26	2.41	2.53	2.53	2.97	3.03	3.09	3.17	2.90	2.42	2.13	2.58
Freq	5.4	3.9	6.1	6.3	5.2	8.2	10.4	12.0	13.1	12.5	9.8	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	408	5.2	158	4.5	104	3.6	50
25	8.1	524	6.2	254	5.6	186	4.7	110
50	8.7	637	7.2	361	6.5	278	5.6	181
100	9.5	824	8.5	570	7.8	438	6.8	291
200	10.4	1145	10.5	1101	9.5	825	8.3	535

Roches Point

51° 48′ 00″ N 08° 15′ 00″ W	UTM 29 E 551719 m N 5739179 m	40 m a.s.l.

Located near the south coast, on the eastern bank of the mouth of Cork Harbour. The distance to water is 500-900 m in the sectors 105°-210° and 200-300 m in sectors 210°-330°. The land/water boundary is generally a steep incline or even a cliff in places. However, a study of wind direction traces indicates that flow separation does not occur. In the sector 330°-005° there is a complex series of land/water fetches. A 70-m high bluff lies 1500 m away.
The anemometer is placed on top of a 3-m high building with a horizontal diagonal dimension of 12.5 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05											13	-7
30	0.10	800	0.40									-1	-7
60	0.10											-5	2
90	0.10											7	8
120	0.10	1000	0.00									18	4
150	0.40	200	0.05	800	0.00							21	-2
180	0.10	500	0.00									11	-6
210	0.05	500	0.00										-4
240	0.05	300	0.00	2000	0.10							-4	2
270	0.05	200	0.00	1500	0.20							4	6
300	0.05	200	0.00	2000	0.10							15	4
330	0.05	200	0.00									17	-1

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.4	83	79	138	145	120	108	105	87	48	59	20	5	1	0	5.5	1.85
30	3.0	126	61	126	186	169	152	83	54	21	14	4	2	0	0	4.8	2.14
60	4.3	92	38	86	131	143	161	128	88	48	56	12	11	4	1	6.0	2.10
90	5.8	70	32	64	106	138	129	137	114	69	87	39	13	2	1	6.7	2.22
120	6.6	76	40	84	138	118	117	117	97	58	73	49	20	8	5	6.6	1.83
150	7.9	61	54	85	115	90	95	94	97	73	100	63	44	23	6	7.4	1.81
180	10.3	51	38	64	85	103	111	101	84	77	111	80	53	27	17	7.9	1.79
210	11.4	37	31	53	87	88	104	111	106	82	142	83	51	16	9	8.2	2.10
240	10.2	38	20	39	78	108	138	137	121	83	125	76	24	10	2	7.7	2.23
270	9.1	48	22	44	78	121	145	137	116	95	106	56	21	6	4	7.4	2.21
300	12.4	39	31	55	93	96	118	113	103	70	131	78	44	15	13	7.9	1.94
330	13.8	72	60	106	106	87	110	100	97	70	89	59	26	11	7	6.9	1.81
Total	100.0	59	40	73	103	107	120	114	101	72	102	61	31	12	7	7.2	1.90

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.8	6.4	6.5	5.8	5.2	4.7	4.6	4.4	5.4	6.3	6.6	7.0	5.9
3	7.7	6.5	6.5	5.8	5.3	4.6	4.4	4.3	5.3	6.3	6.7	7.3	5.9
6	7.6	6.7	6.6	5.8	5.2	4.7	4.4	4.3	5.3	6.1	6.8	7.4	5.9
9	7.4	6.7	6.6	6.4	6.0	5.3	5.1	4.5	5.6	6.4	6.7	7.3	6.2
12	7.9	7.3	7.9	7.3	6.7	6.2	6.0	5.6	6.7	7.1	7.4	7.5	7.0
15	8.4	7.7	8.2	7.5	7.0	6.4	6.4	6.0	7.1	7.3	7.7	7.8	7.3
18	7.7	6.9	7.5	7.0	6.6	6.2	6.2	5.6	6.4	6.4	6.8	7.4	6.7
21	7.6	6.4	6.5	5.8	5.4	5.1	5.0	4.4	5.3	6.2	6.6	7.2	6.0
Day	7.8	6.8	7.0	6.4	5.9	5.4	5.3	4.9	5.9	6.5	6.9	7.4	6.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	8.4	9.7	9.9	7.3	7.2	7.9	8.8	9.6	9.1	8.3	6.2	8.3
	2.03	2.19	2.30	2.37	1.79	1.79	1.77	2.01	2.49	2.47	2.32	1.81	2.03
25	7.8	9.1	10.6	10.8	8.0	7.9	8.7	9.6	10.4	9.9	9.1	6.8	9.1
	2.10	2.25	2.35	2.42	1.85	1.85	1.82	2.06	2.55	2.54	2.39	1.86	2.08
50	8.4	9.8	11.3	11.5	8.6	8.5	9.3	10.2	11.2	10.6	9.8	7.3	9.7
	2.15	2.31	2.41	2.48	1.90	1.90	1.87	2.12	2.62	2.61	2.46	1.91	2.14
100	9.1	10.6	12.1	12.4	9.3	9.2	10.0	11.0	12.0	11.5	10.6	7.9	10.5
	2.08	2.25	2.36	2.44	1.84	1.84	1.82	2.07	2.56	2.54	2.38	1.85	2.09
200	10.1	11.6	13.2	13.5	10.3	10.1	10.9	12.0	13.1	12.6	11.7	8.7	11.5
	1.97	2.15	2.28	2.35	1.74	1.74	1.75	1.99	2.45	2.42	2.26	1.75	2.01
Freq	6.9	4.3	5.2	6.0	5.7	6.4	9.1	12.0	11.9	10.4	10.8	11.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	6.1	7.0	6.9	4.7	5.1	5.7	6.2	6.8	6.2	5.6	4.1	5.8
	1.77	1.92	2.06	2.05	1.51	1.51	1.57	1.78	2.19	2.09	1.89	1.51	1.76
25	6.4	7.3	8.3	8.2	5.7	6.1	6.7	7.4	8.0	7.4	6.7	4.9	6.9
	1.91	2.05	2.16	2.15	1.63	1.62	1.66	1.88	2.31	2.24	2.04	1.62	1.87
50	7.4	8.3	9.4	9.3	6.6	7.1	7.7	8.4	9.1	8.5	7.8	5.7	8.0
	2.15	2.25	2.31	2.31	1.83	1.82	1.81	2.05	2.52	2.48	2.29	1.82	2.05
100	8.8	9.7	10.8	10.6	7.9	8.4	9.0	9.8	10.6	10.0	9.2	6.8	9.3
	2.29	2.41	2.49	2.49	1.95	1.94	1.94	2.19	2.70	2.65	2.44	1.94	2.20
200	11.0	11.8	12.7	12.6	9.8	10.4	10.8	11.8	12.8	12.3	11.4	8.4	11.3
	2.19	2.31	2.40	2.40	1.87	1.85	1.87	2.11	2.60	2.54	2.33	1.85	2.13
Freq	5.9	4.1	5.6	6.2	5.7	6.8	9.7	12.5	11.8	10.2	11.0	10.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	5.4	6.1	5.9	4.1	4.4	5.0	5.4	5.9	5.4	4.8	3.6	5.1
	1.78	1.95	2.07	2.01	1.51	1.51	1.60	1.80	2.20	2.07	1.87	1.51	1.77
25	5.8	6.6	7.4	7.2	5.1	5.5	6.1	6.7	7.2	6.6	5.9	4.5	6.2
	1.91	2.05	2.16	2.10	1.62	1.61	1.68	1.89	2.31	2.20	2.01	1.62	1.87
50	6.8	7.7	8.6	8.3	6.1	6.5	7.1	7.7	8.3	7.7	6.9	5.3	7.3
	2.11	2.22	2.30	2.24	1.78	1.77	1.81	2.03	2.50	2.40	2.22	1.78	2.02
100	8.1	9.1	9.9	9.6	7.3	7.7	8.4	9.1	9.7	9.1	8.3	6.3	8.6
	2.32	2.44	2.52	2.45	1.96	1.94	1.99	2.23	2.74	2.64	2.44	1.96	2.22
200	10.1	10.9	11.7	11.4	8.9	9.5	10.1	10.8	11.7	11.1	10.2	7.8	10.4
	2.22	2.35	2.44	2.37	1.87	1.86	1.92	2.15	2.64	2.54	2.33	1.88	2.15
Freq	5.7	4.2	5.6	6.2	5.7	7.1	10.0	12.4	11.6	10.3	11.1	10.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.3	4.8	4.5	3.3	3.6	4.0	4.3	4.6	4.2	3.6	2.9	4.0
	1.82	1.98	2.08	1.94	1.51	1.52	1.63	1.82	2.18	2.05	1.86	1.49	1.77
25	5.0	5.7	6.3	5.8	4.3	4.7	5.2	5.6	6.0	5.5	4.8	3.8	5.2
	1.93	2.06	2.15	2.02	1.60	1.60	1.71	1.90	2.28	2.17	1.98	1.58	1.86
50	6.0	6.8	7.4	7.0	5.3	5.7	6.3	6.7	7.2	6.6	5.8	4.6	6.3
	2.09	2.20	2.27	2.13	1.73	1.73	1.81	2.01	2.42	2.33	2.15	1.72	1.98
100	7.2	8.1	8.8	8.3	6.4	6.9	7.5	8.0	8.5	7.9	7.0	5.6	7.5
	2.38	2.45	2.47	2.35	1.97	1.96	2.02	2.23	2.70	2.65	2.44	1.96	2.21
200	8.8	9.7	10.4	9.8	7.8	8.3	9.0	9.6	10.2	9.6	8.6	6.9	9.1
	2.30	2.40	2.47	2.33	1.90	1.89	1.98	2.20	2.65	2.56	2.35	1.88	2.18
Freq	5.4	4.4	5.7	6.2	5.9	7.4	10.3	12.3	11.4	10.4	11.3	9.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	457	5.2	184	4.5	122	3.5	59
25	8.0	582	6.1	291	5.5	212	4.6	126
50	8.6	700	7.0	399	6.4	308	5.6	203
100	9.3	898	8.2	600	7.6	463	6.7	314
200	10.2	1231	10.0	1112	9.2	845	8.0	558

Shannon

52° 41 ′ 00″ N 08° 55 ′ 00″ W	UTM 29 E 505633 m	N 5837171 m	8 m a.s.l.

Situated on the N bank of the 3-km wide Shannon Estuary. The airport is bounded on the W by the 6-km wide estuary of the river Fergus. The nearest point on the Atlantic seaboard is 40 km to the W. The airport is built on very low-lying land - there is no land over 75 m within 11 km. There are mountains, hills and higher ground in almost all directions at different distances. At low tide vast expanses of mudflats are exposed beyond 4-m high embankments in the sectors SSE to WSW. From WSW to N the tidal mudflats are more than 2.5 km away.
The anemometer is placed S of the runways on a hut (3 × 3 × 3 m). Nearby buildings appear in sectors N to E.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	300	0.15	600	0.03	1200	0.20					-7	
30	0.05	150	0.30	400	0.03	2500	0.20					-11	
60	0.05	1800	0.40									-1	
90	0.05	2000	0.01									-3	
120	0.05	700	0.10	1400	0.01								
150	0.05	1000	0.01										
180	0.05	1000	0.01										
210	0.05	1000	0.01										
240	0.05												
270	0.05	1200	0.20										
300	0.05	1000	0.20										
330	0.05	900	0.20										

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.3	84	131	190	178	137	106	76	47	22	20	8	2	0	0	4.3	1.70
30	4.5	106	134	187	182	137	106	71	48	18	9	3	0	0	0	4.2	1.83
60	3.5	102	125	177	181	142	132	68	44	18	11	0	0	0	0	4.3	1.97
90	4.4	114	111	126	140	130	137	86	69	33	35	14	2	2	0	5.0	1.82
120	10.1	56	100	183	192	135	113	77	50	28	39	20	6	1	0	4.8	1.60
150	10.2	41	65	95	123	145	153	132	88	47	66	31	10	3	1	6.2	2.04
180	9.2	48	51	103	135	156	145	127	94	48	58	26	4	1	1	6.0	2.09
210	7.7	48	60	117	133	130	149	120	89	60	62	24	7	1	0	6.0	2.12
240	12.3	32	48	83	106	118	122	120	107	75	108	49	20	7	5	7.1	2.04
270	13.1	29	49	99	128	141	133	120	101	62	79	33	18	6	2	6.5	1.95
300	11.0	42	63	116	151	124	128	103	97	57	75	33	10	2	0	6.1	1.96
330	7.6	72	109	203	199	132	93	66	49	27	32	14	2	0	1	4.4	1.53
Total	100.0	54	77	130	148	135	128	103	80	47	59	26	9	3	1	5.7	1.82

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.7	5.2	5.1	4.2	4.0	3.9	3.7	3.4	4.2	4.6	4.8	5.2	4.5
3	5.7	5.3	5.2	4.1	3.9	3.7	3.7	3.1	4.1	4.5	4.9	5.3	4.4
6	5.6	5.3	5.1	4.0	4.0	3.7	3.7	3.2	4.1	4.6	4.9	5.3	4.4
9	5.6	5.3	5.3	4.8	5.0	4.6	4.5	3.8	4.7	4.8	4.9	5.3	4.9
12	6.1	6.1	6.7	5.8	5.7	5.3	5.1	4.5	5.8	5.8	5.7	5.4	5.7
15	6.4	6.5	7.2	6.3	6.0	5.7	5.6	4.8	6.1	5.9	6.1	5.7	6.0
18	5.9	5.6	6.3	6.0	5.8	5.7	5.4	4.6	5.2	5.1	5.1	5.3	5.5
21	5.8	5.4	5.4	4.6	4.5	4.6	4.4	3.8	4.4	4.7	4.8	5.2	4.8
Day	5.8	5.6	5.8	5.0	4.9	4.7	4.5	3.9	4.8	5.0	5.1	5.3	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.3	7.6	7.1	7.1	6.9	8.0	8.3	8.2	9.8	10.0	9.5	7.8	8.4
	1.92	2.09	2.22	2.16	1.93	2.24	2.43	2.47	2.23	2.19	2.18	1.87	2.06
25	7.9	8.3	7.8	7.8	7.6	8.8	9.1	9.0	10.7	10.9	10.4	8.5	9.2
	1.98	2.15	2.29	2.23	1.99	2.31	2.51	2.55	2.27	2.22	2.22	1.92	2.11
50	8.6	8.9	8.3	8.4	8.1	9.4	9.7	9.6	11.4	11.6	11.1	9.1	9.9
	2.03	2.21	2.35	2.29	2.04	2.37	2.57	2.61	2.33	2.28	2.29	1.98	2.17
100	9.3	9.7	9.0	9.1	8.8	10.2	10.5	10.5	12.2	12.4	11.9	9.8	10.6
	1.97	2.14	2.28	2.22	1.98	2.30	2.49	2.53	2.29	2.24	2.24	1.92	2.13
200	10.2	10.7	10.0	10.0	9.7	11.3	11.7	11.6	13.2	13.4	12.9	10.7	11.6
	1.87	2.03	2.15	2.10	1.87	2.17	2.36	2.39	2.21	2.17	2.17	1.84	2.06
Freq	6.7	5.1	3.8	4.2	8.4	10.3	9.5	8.1	11.0	12.8	11.6	8.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	5.3	4.8	5.0	4.7	5.9	5.7	5.8	7.2	7.1	6.7	4.9	5.9
	1.69	1.78	1.92	1.80	1.58	1.99	2.04	2.08	2.02	1.93	1.93	1.55	1.79
25	6.2	6.4	5.7	6.0	5.6	7.0	6.9	6.9	8.4	8.3	7.9	5.9	7.0
	1.82	1.93	2.07	1.94	1.70	2.14	2.20	2.24	2.10	2.01	2.03	1.67	1.90
50	7.2	7.4	6.6	6.9	6.5	8.1	7.9	8.0	9.6	9.4	8.9	6.9	8.1
	2.05	2.17	2.33	2.18	1.91	2.40	2.47	2.53	2.24	2.13	2.18	1.86	2.08
100	8.6	8.8	7.9	8.2	7.8	9.6	9.4	9.4	10.9	10.7	10.3	8.2	9.4
	2.17	2.31	2.47	2.32	2.04	2.56	2.63	2.69	2.41	2.30	2.34	1.98	2.25
200	10.7	10.9	9.8	10.3	9.7	11.9	11.7	11.7	12.8	12.5	12.2	10.1	11.5
	2.08	2.20	2.37	2.22	1.94	2.45	2.51	2.56	2.33	2.22	2.26	1.90	2.20
Freq	6.3	4.6	3.6	4.4	9.9	10.2	9.3	7.8	12.1	13.0	11.1	7.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	4.7	4.2	4.3	4.2	5.1	5.0	5.1	6.3	6.1	5.7	4.2	5.1
	1.68	1.81	1.93	1.77	1.62	2.01	2.05	2.04	2.03	1.94	1.91	1.52	1.80
25	5.6	5.8	5.1	5.4	5.2	6.3	6.2	6.3	7.6	7.5	7.0	5.2	6.3
	1.79	1.94	2.06	1.90	1.73	2.14	2.20	2.18	2.11	2.01	1.99	1.63	1.89
50	6.6	6.8	6.0	6.3	6.1	7.4	7.2	7.3	8.8	8.6	8.1	6.1	7.4
	1.98	2.14	2.29	2.10	1.92	2.37	2.44	2.41	2.22	2.12	2.13	1.79	2.05
100	7.9	8.1	7.2	7.5	7.3	8.8	8.6	8.7	10.1	9.9	9.4	7.3	8.7
	2.18	2.35	2.51	2.31	2.10	2.60	2.67	2.65	2.43	2.31	2.33	1.97	2.26
200	9.7	9.9	8.8	9.3	8.9	10.9	10.6	10.8	11.9	11.6	11.1	9.0	10.5
	2.09	2.25	2.40	2.21	2.01	2.49	2.56	2.54	2.36	2.24	2.26	1.88	2.21
Freq	6.2	4.5	3.6	4.7	10.1	10.2	9.1	7.9	12.3	13.0	10.9	7.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.6	3.3	3.3	3.4	4.0	3.9	4.1	4.9	4.8	4.4	3.3	4.0
	1.73	1.83	1.88	1.71	1.66	2.01	2.06	1.98	2.03	1.95	1.87	1.54	1.80
25	4.8	4.8	4.3	4.4	4.5	5.3	5.2	5.4	6.4	6.2	5.8	4.4	5.3
	1.83	1.94	1.99	1.81	1.76	2.13	2.19	2.09	2.09	2.01	1.95	1.63	1.89
50	5.8	5.8	5.2	5.3	5.4	6.4	6.3	6.5	7.6	7.4	6.9	5.3	6.4
	1.99	2.10	2.17	1.97	1.91	2.31	2.38	2.24	2.19	2.10	2.05	1.76	2.01
100	7.0	7.0	6.3	6.4	6.5	7.7	7.5	7.8	8.9	8.7	8.1	6.4	7.6
	2.26	2.39	2.47	2.24	2.17	2.63	2.71	2.55	2.37	2.27	2.26	2.00	2.24
200	8.5	8.5	7.7	7.9	8.0	9.4	9.2	9.5	10.5	10.3	9.7	7.8	9.2
	2.18	2.31	2.38	2.16	2.09	2.53	2.61	2.46	2.38	2.28	2.24	1.93	2.22
Freq	6.0	4.4	3.7	5.5	10.1	10.0	8.9	8.4	12.4	12.8	10.5	7.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.5	470	5.3	190	4.6	125	3.6	61
25	8.1	600	6.2	299	5.6	219	4.7	130
50	8.7	720	7.2	411	6.5	318	5.7	210
100	9.4	920	8.4	613	7.7	475	6.8	325
200	10.3	1248	10.2	1121	9.3	855	8.1	570

Valentia

51° 56′ 00″ N	10° 15′ 00″ W	UTM 29	E 414056 m	N 5754481 m	18 m a.s.l.

Location on the SW coast at the Valentia Observatory, which is situated ENE of Valentia Island and on the S bank of the estuary of the Valentia River. Although it is within 3.5 km of the open sea the Observatory is surrounded by hills on almost all sides. The surrounding countryside is mostly rather barren and there are peaks in almost all directions up to 500 metres height and at distances beyond 2 km. Winds from directions between N and SSE through E have crossed at least one mountain range before reaching the local area.
The anemometer is situated above a hut with dimensions 3 × 3 × 3 m. The main buildings appear to the NW at distances of 120–180 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	5000	0.00									1	4
30	0.05	9000	0.00									3	-2
60	0.20	1600	0.05									-5	-7
90	0.05											-16	-5
120	0.01	200	0.05									-18	2
150	0.01	150	0.30	1200	0.05							-10	7
180	0.01	150	0.10									1	5
210	0.01	100	0.05									3	-2
240	0.01	120	0.05	1500	0.01							-4	-6
270	0.01	150	0.20	750	0.00							-10	-3
300	0.01	100	0.30	350	0.00	1000	0.05	5500	0.00			-16	2
330	0.01	75	0.05	550	0.00	1000	0.05	4000	0.20			-9	6

Height of anemometer: 12.0 m a.g.l. Period: 70010103-79123124

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.6	72	38	58	97	103	142	151	109	74	95	41	12	6	1	7.0	2.29
30	6.3	160	129	113	100	96	105	91	79	48	54	17	6	1	2	5.1	1.64
60	8.7	198	224	162	117	77	83	65	36	19	15	6	1	0	0	3.4	1.31
90	5.6	121	84	84	135	138	136	108	70	33	46	25	17	4	0	5.6	1.76
120	3.9	125	56	78	114	105	128	103	103	45	66	49	22	5	1	6.3	1.83
150	7.9	69	39	53	104	91	118	120	109	77	116	69	27	7	1	7.4	2.15
180	13.9	48	39	72	113	119	122	128	125	84	98	36	11	3	0	6.9	2.35
210	10.2	49	31	50	81	111	112	126	135	91	124	53	28	5	4	7.6	2.32
240	8.3	58	33	44	83	102	124	131	118	94	129	52	25	6	2	7.5	2.33
270	11.0	62	52	90	154	122	125	106	92	58	85	35	14	4	0	6.2	1.91
300	8.3	72	46	72	139	120	129	110	111	74	83	32	9	3	0	6.4	2.12
330	8.3	70	43	75	104	106	124	140	117	74	96	39	9	3	0	6.8	2.34
Total	100.0	85	65	78	112	108	120	116	103	67	87	38	15	4	1	6.5	2.03

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.6	6.1	5.9	4.5	4.2	3.9	3.5	3.5	4.6	5.4	6.1	6.2	5.0
3	6.7	6.1	5.8	4.5	4.4	3.9	3.6	3.5	4.6	5.4	6.2	6.6	5.1
6	6.4	6.2	5.8	4.4	4.5	3.7	3.6	3.5	4.7	5.6	6.2	6.7	5.1
9	6.6	6.2	6.0	5.1	5.2	4.6	4.3	4.0	5.1	5.5	6.3	6.5	5.4
12	7.0	6.7	6.9	6.1	6.0	5.4	5.3	5.2	6.2	6.3	6.6	6.7	6.2
15	7.3	6.9	7.2	6.5	6.4	5.8	5.6	5.5	6.3	6.5	6.9	6.8	6.5
18	6.8	6.4	6.5	6.0	5.8	5.6	5.3	5.0	5.5	5.7	6.1	6.4	5.9
21	6.6	6.0	5.7	4.9	4.5	4.4	3.9	3.7	4.7	5.5	6.1	6.2	5.2
Day	6.8	6.3	6.2	5.2	5.1	4.7	4.4	4.2	5.2	5.7	6.3	6.5	5.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.9	7.1	6.4	8.2	10.6	12.9	11.0	10.6	10.6	9.1	9.3	10.4	9.8
	2.17	1.78	1.59	1.73	1.91	2.28	2.45	2.58	2.60	1.99	2.05	2.55	2.03
25	9.8	7.8	7.1	8.9	11.5	14.0	12.0	11.5	11.5	10.0	10.2	11.4	10.7
	2.23	1.84	1.63	1.75	1.93	2.30	2.49	2.63	2.65	2.03	2.10	2.59	2.06
50	10.5	8.4	7.6	9.5	12.3	14.9	12.8	12.3	12.3	10.7	10.9	12.1	11.4
	2.29	1.89	1.68	1.80	1.96	2.33	2.55	2.70	2.72	2.08	2.15	2.67	2.11
100	11.3	9.1	8.2	10.2	13.1	15.8	13.7	13.2	13.2	11.4	11.7	13.0	12.2
	2.23	1.83	1.63	1.77	1.95	2.33	2.51	2.65	2.67	2.05	2.11	2.62	2.09
200	12.3	10.0	8.9	11.0	14.0	16.9	14.8	14.3	14.3	12.4	12.7	14.1	13.2
	2.14	1.73	1.56	1.71	1.91	2.29	2.44	2.57	2.58	1.97	2.04	2.53	2.04
Freq	7.0	5.3	7.1	7.3	5.9	8.6	11.2	9.2	8.3	11.1	10.1	8.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	4.4	4.3	6.2	8.2	9.3	7.5	7.5	7.5	6.3	6.7	7.5	6.9
	1.87	1.34	1.31	1.63	1.87	2.15	2.31	2.29	2.30	1.70	1.87	2.28	1.82
25	7.2	5.3	5.2	7.3	9.6	10.9	8.9	8.9	8.8	7.5	7.9	8.8	8.2
	2.00	1.44	1.40	1.69	1.91	2.19	2.42	2.39	2.41	1.78	1.96	2.38	1.90
50	8.2	6.2	6.1	8.3	10.7	12.1	10.1	10.0	10.0	8.5	9.0	10.0	9.3
	2.22	1.62	1.54	1.79	1.98	2.26	2.59	2.56	2.58	1.92	2.10	2.55	2.02
100	9.7	7.4	7.1	9.5	12.0	13.6	11.5	11.4	11.4	9.8	10.4	11.4	10.6
	2.37	1.72	1.64	1.93	2.11	2.40	2.78	2.75	2.77	2.06	2.26	2.74	2.17
200	11.9	9.2	8.7	11.1	13.6	15.3	13.5	13.5	13.5	11.6	12.3	13.5	12.5
	2.27	1.64	1.58	1.87	2.06	2.36	2.69	2.66	2.68	1.99	2.18	2.65	2.14
Freq	6.5	5.1	7.8	7.1	5.5	9.7	11.6	8.4	8.4	11.9	9.6	8.5	100.0

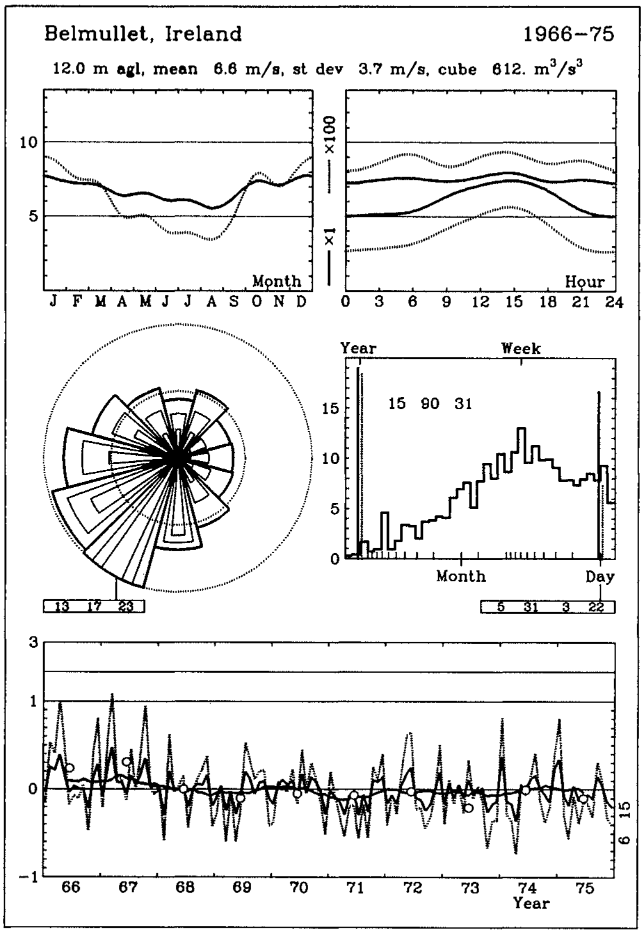
Roughness Class 2

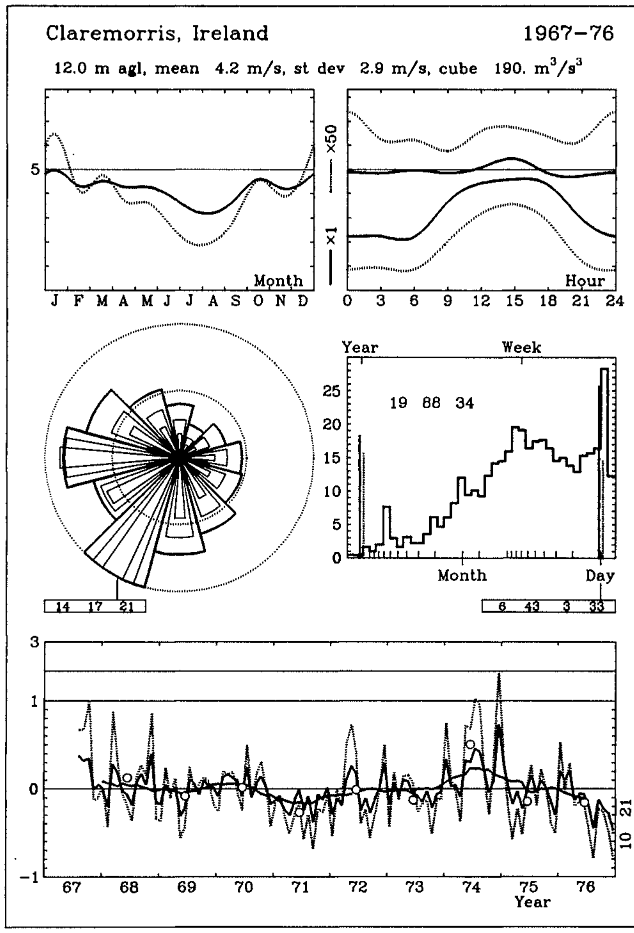
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	3.7	4.0	5.6	7.3	7.9	6.6	6.6	6.4	5.5	5.9	6.5	6.0
	1.84	1.30	1.35	1.65	1.92	2.13	2.31	2.30	2.24	1.73	1.88	2.26	1.83
25	6.3	4.7	4.9	6.8	8.8	9.6	8.0	8.0	7.8	6.8	7.2	7.9	7.4
	1.95	1.39	1.42	1.70	1.96	2.17	2.40	2.38	2.34	1.80	1.96	2.35	1.90
50	7.4	5.6	5.7	7.8	10.0	10.9	9.2	9.2	9.0	7.8	8.3	9.1	8.5
	2.14	1.53	1.54	1.79	2.01	2.23	2.55	2.53	2.48	1.92	2.08	2.49	2.00
100	8.8	6.7	6.8	9.0	11.4	12.4	10.6	10.6	10.4	9.1	9.6	10.5	9.8
	2.35	1.68	1.69	1.95	2.13	2.35	2.78	2.77	2.71	2.10	2.28	2.73	2.17
200	10.7	8.2	8.2	10.5	13.0	14.1	12.5	12.5	12.3	10.8	11.4	12.3	11.6
	2.26	1.61	1.62	1.89	2.13	2.35	2.70	2.68	2.63	2.03	2.20	2.64	2.15
Freq	6.4	5.3	7.7	6.9	5.8	9.9	11.3	8.4	8.8	11.7	9.5	8.3	100.0

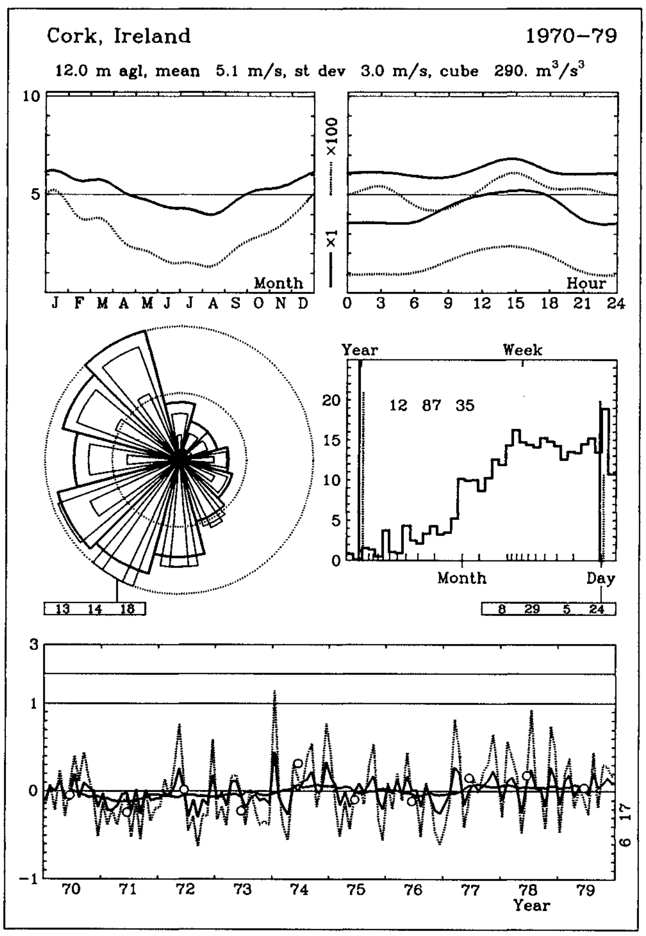
Roughness Class 3

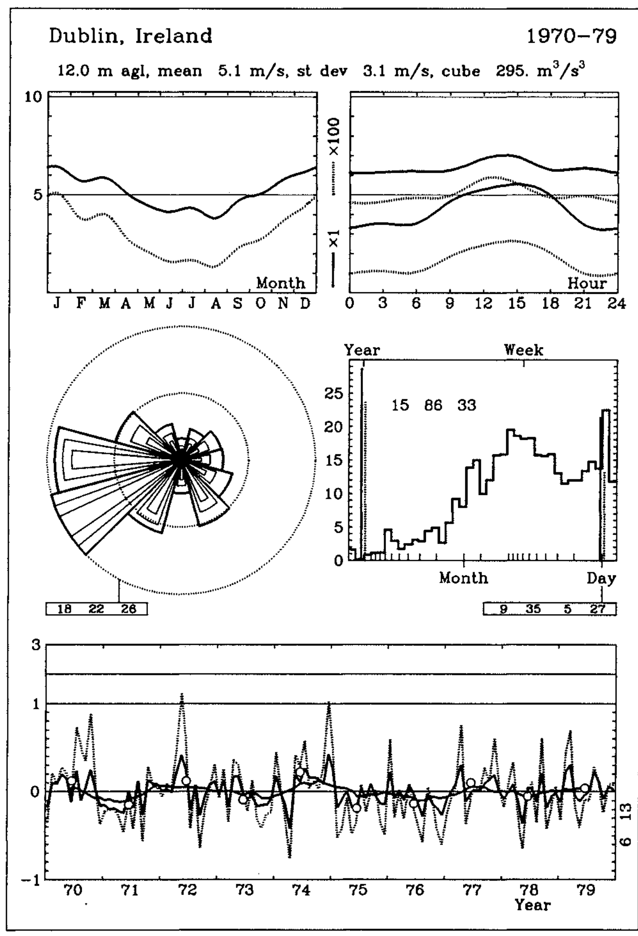
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	2.9	3.3	4.5	5.8	6.1	5.2	5.2	5.0	4.4	4.7	5.0	4.7
	1.77	1.26	1.39	1.68	1.96	2.11	2.32	2.30	2.20	1.75	1.91	2.26	1.84
25	5.2	3.8	4.3	5.9	7.5	7.8	6.7	6.7	6.5	5.7	6.1	6.5	6.2
	1.87	1.33	1.45	1.72	1.99	2.15	2.40	2.37	2.28	1.81	1.98	2.34	1.90
50	6.2	4.7	5.2	7.0	8.9	9.2	8.0	8.0	7.7	6.8	7.3	7.8	7.4
	2.01	1.44	1.54	1.79	2.04	2.20	2.51	2.49	2.40	1.91	2.08	2.45	1.98
100	7.5	5.7	6.2	8.2	10.3	10.7	9.4	9.4	9.1	8.1	8.6	9.1	8.7
	2.28	1.63	1.71	1.92	2.13	2.30	2.73	2.70	2.62	2.09	2.28	2.68	2.14
200	9.1	7.0	7.5	9.6	11.9	12.4	11.1	11.1	10.8	9.6	10.1	10.8	10.3
	2.20	1.58	1.68	1.94	2.18	2.36	2.73	2.70	2.61	2.08	2.27	2.67	2.16
Freq	6.3	5.7	7.5	6.6	6.3	10.2	10.9	8.4	9.3	11.4	9.4	8.1	100.0

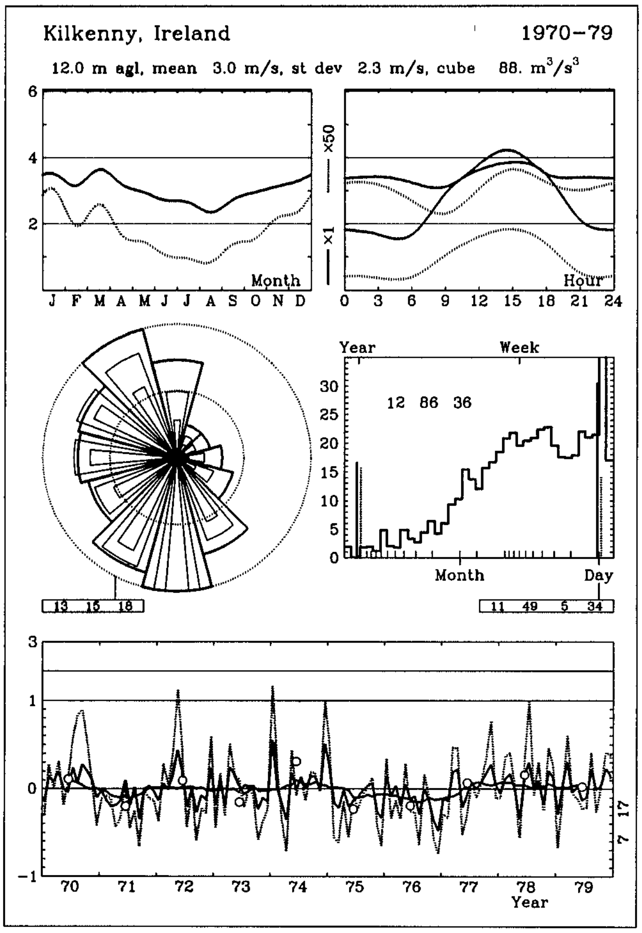
z	Class 0		Class 1		Class 2		Class 3	
10	8.7	749	6.2	301	5.4	198	4.2	95
25	9.4	955	7.3	472	6.5	344	5.5	204
50	10.1	1138	8.2	642	7.5	498	6.5	327
100	10.8	1414	9.4	903	8.7	712	7.7	499
200	11.7	1840	11.1	1488	10.2	1169	9.1	814

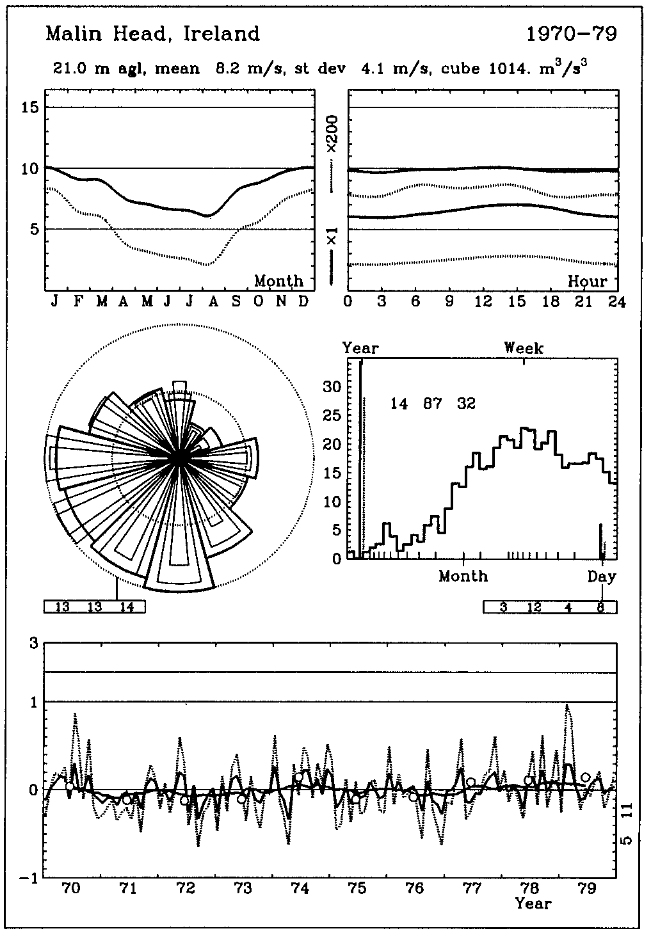

Belmullet, Ireland 1966–75
12.0 m agl, mean 6.6 m/s, st dev 3.7 m/s, cube 612. m³/s³
Month
Hour
×100
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year Week
15 90 31
Month Day
13 17 23
5 31 3 22
66 67 68 69 70 71 72 73 74 75
Year
15
6


Claremorris, Ireland 1967–76
12.0 m agl, mean 4.2 m/s, st dev 2.9 m/s, cube 190. m³/s³
Month
Hour
×50
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year Week
19 88 34
Month Day
14 17 21
6 43 3 33
67 68 69 70 71 72 73 74 75 76
Year
21
10


Cork, Ireland 1970–79
12.0 m agl, mean 5.1 m/s, st dev 3.0 m/s, cube 290. m³/s³
Month
Hour
×100
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year Week
12 87 35
Month Day
13 14 18
8 29 5 24
70 71 72 73 74 75 76 77 78 79
Year
17
6


Dublin, Ireland 1970–79
12.0 m agl, mean 5.1 m/s, st dev 3.1 m/s, cube 295. m³/s³
Month
Hour
×100
×1
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year Week
15 86 33
Month Day
18 22 26
9 35 5 27
70 71 72 73 74 75 76 77 78 79
Year
13
6


Kilkenny, Ireland
1970–79
12.0 m agl, mean 3.0 m/s, st dev 2.3 m/s, cube 88. m^3/s^3
×50
×1
Month
Hour
Year
Week
12 86 36
Month
Day
13 15 18
11 49 5 34
7 17
Year


Malin Head, Ireland
1970–79
21.0 m agl, mean 8.2 m/s, st dev 4.1 m/s, cube 1014. m^3/s^3
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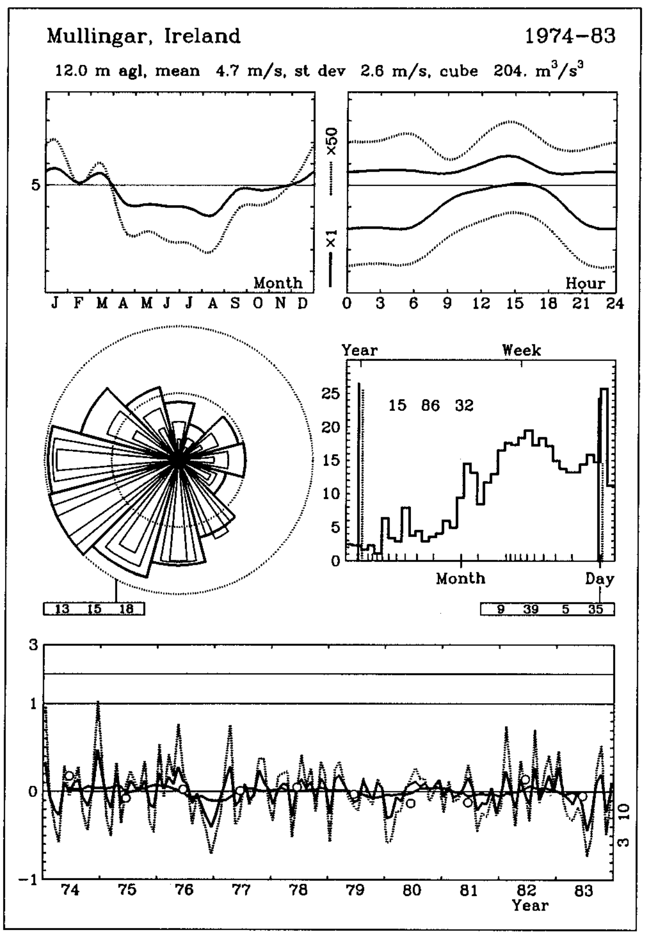
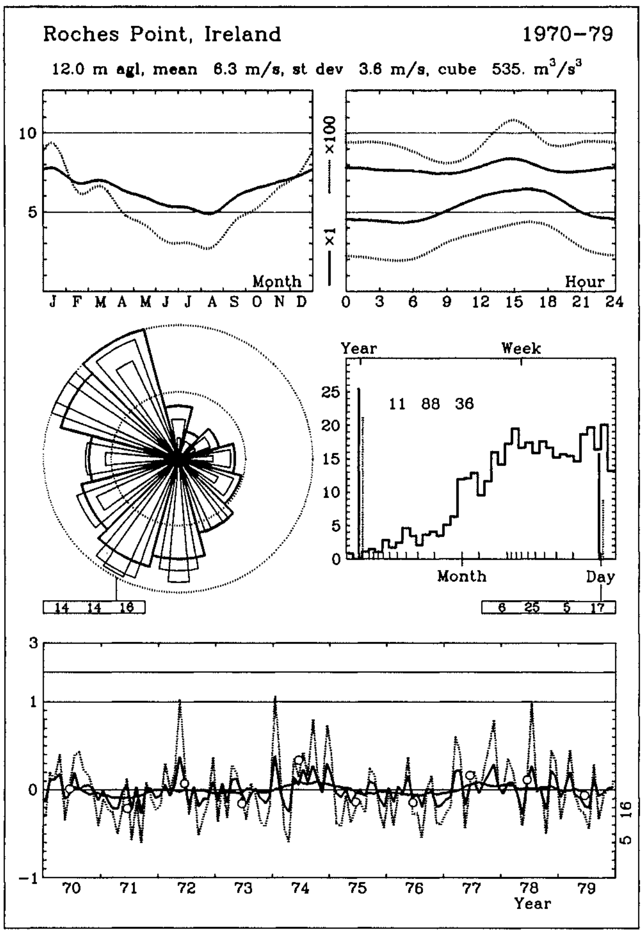
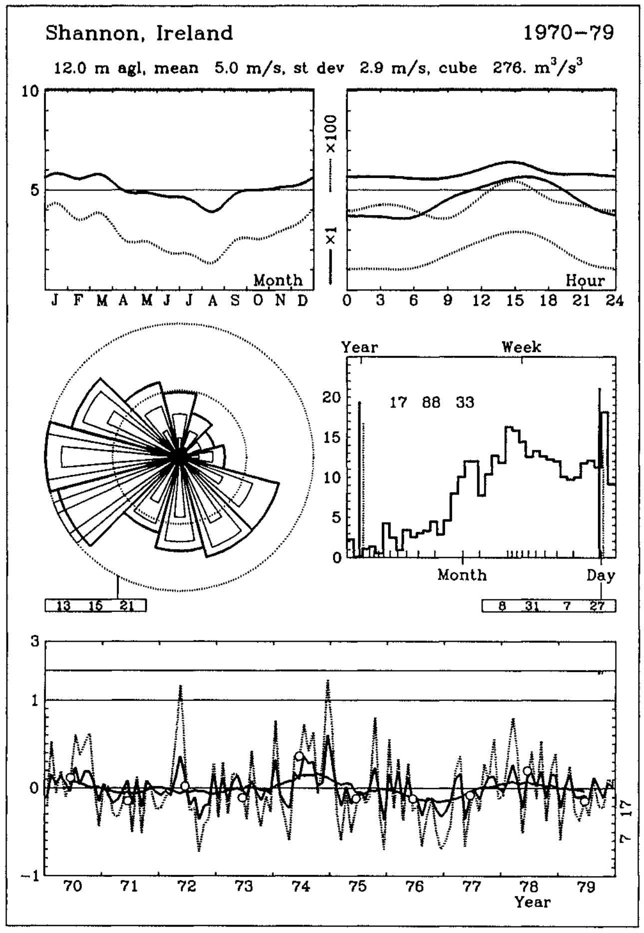
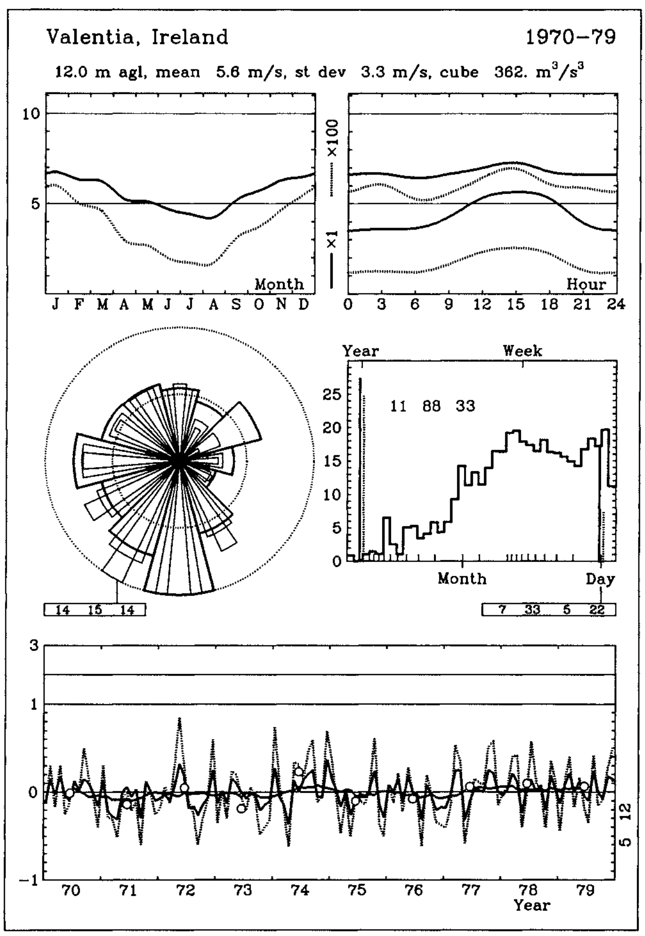
3 12 4 8
5 11
Year


Mullingar, Ireland
1974–83
12.0 m agl, mean 4.7 m/s, st dev 2.6 m/s, cube 204. m^3/s^3
×50
×1
Month
Hour
Year
Week
15 86 32
Month
Day
13 15 18
9 39 5 35
3 10
Year


Roches Point, Ireland 1970–79
12.0 m agl, mean 6.3 m/s, st dev 3.6 m/s, cube 535. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
11 88 36
Month
Day
14 14 16
6 25 5 17
Year
70 71 72 73 74 75 76 77 78 79
5 16


Shannon, Ireland 1970–79
12.0 m agl, mean 5.0 m/s, st dev 2.9 m/s, cube 276. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
17 88 33
Month
Day
13 15 21
8 31 7 27
Year
70 71 72 73 74 75 76 77 78 79
7 17


Valentia, Ireland 1970–79
12.0 m agl, mean 5.6 m/s, st dev 3.3 m/s, cube 362. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
11 88 33
Month
Day
14 15 14
7 33 5 22
Year
70 71 72 73 74 75 76 77 78 79
5 12

Alghero

40° 38′ 00″ N 08° 17′ 00″ E	UTM 32 E 439391 m N 4498380 m	40 m a.s.l.

Located at the coast in the northwestern part of Sardinia. The airport lies approx. 5 km north of the village of Fertilia and the distances to the sea are 5 km to the south and 9 km to the west. Higher grounds lie more than 15 km to the southeast. Hills with heights up to 436 m lie to the southwest at distances of 2 to 4 km; otherwise the landscape is rather flat out to a distance of a few kilometres.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.05	3000	0.10							3	-1
30	0.01	1000	0.05	3000	0.10							-2	-5
60	0.01	1000	0.05	3000	0.10							-11	-4
90	0.01	1000	0.05	3000	0.10							-14	1
120	0.01	1000	0.05	3000	0.10							-8	5
150	0.01	1000	0.05	3000	0.10								4
180	0.01	1000	0.05	3000	0.00							3	-1
210	0.05	2000	0.10	6000	0.00							-2	-5
240	0.05	2000	0.10	6000	0.00							-10	-4
270	0.01	2000	0.10	8000	0.00							-14	1
300	0.01	2000	0.10	8000	0.00							-8	5
330	0.01	1000	0.05	3000	0.10	10000	0.00						4

Height of anemometer: 10.0 m a.g.l. Period: 60010100-69123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.9	406	177	151	104	50	39	24	16	10	14	7	2	0	0	2.3	1.02
30	12.8	213	198	190	137	85	61	44	30	16	14	7	3	1	0	3.2	1.24
60	6.8	344	113	132	114	85	65	43	37	18	29	14	6	1	0	3.3	1.16
90	4.0	553	62	75	78	56	64	47	30	12	15	6	2	0	0	2.3	0.96
120	2.8	806	51	40	37	30	15	11	2	5	1	0	0	0	1	0.4	0.54
150	2.8	758	68	57	39	23	17	9	10	7	6	4	1	0	0	0.6	0.60
180	8.1	290	64	90	91	75	71	75	79	34	89	33	7	1	0	4.9	1.44
210	12.9	173	78	124	152	118	108	90	65	32	48	12	2	0	0	4.8	1.69
240	8.0	264	67	111	124	92	82	80	63	36	64	11	4	1	0	4.5	1.45
270	12.0	209	51	85	107	105	108	100	87	34	72	28	7	4	2	5.6	1.70
300	16.8	135	37	67	95	109	124	108	94	59	102	44	17	7	1	6.6	1.93
330	7.2	308	83	111	101	81	69	69	47	34	59	24	7	5	1	4.2	1.24
Total	100.0	277	88	110	110	89	83	72	58	31	54	20	6	2	1	4.4	1.35

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.7	4.0	3.6	3.0	2.1	1.7	1.3	1.6	1.7	2.4	4.0	4.0	2.7
3	3.6	3.9	3.7	3.0	2.3	1.7	1.4	1.5	1.8	2.3	3.8	3.8	2.7
6	3.7	3.7	3.3	2.9	2.1	1.9	1.4	1.5	1.6	2.2	3.3	4.1	2.6
9	3.8	4.0	4.4	4.5	4.0	4.0	3.7	3.7	3.3	2.9	3.8	4.1	3.8
12	5.4	6.1	6.0	5.7	5.5	5.6	5.6	5.7	5.2	4.5	5.2	5.6	5.5
15	5.3	6.0	6.2	5.7	5.7	6.0	6.1	6.0	5.4	4.8	4.9	5.2	5.6
18	3.8	4.3	4.3	4.1	4.3	4.5	4.6	4.3	3.4	2.8	3.6	4.2	4.0
21	3.5	3.9	3.5	2.9	2.3	1.9	1.8	1.9	1.7	2.2	3.5	4.2	2.8
Day	4.1	4.5	4.4	4.0	3.5	3.4	3.2	3.3	3.0	3.0	4.0	4.4	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.6	5.2	4.5	1.6	1.6	5.4	6.5	6.8	8.0	8.6	6.6	6.1
	1.21	1.44	1.38	1.21	0.74	0.74	1.35	1.64	1.51	1.67	1.84	1.43	1.38
25	4.2	5.1	5.7	4.9	1.8	1.7	5.9	7.1	7.4	8.8	9.4	7.2	6.7
	1.25	1.48	1.42	1.24	0.76	0.75	1.39	1.69	1.55	1.70	1.87	1.47	1.41
50	4.5	5.5	6.2	5.3	1.9	1.9	6.4	7.7	8.0	9.4	10.0	7.7	7.2
	1.28	1.52	1.46	1.27	0.78	0.77	1.43	1.74	1.59	1.75	1.93	1.51	1.45
100	4.9	5.9	6.7	5.7	2.0	2.0	6.9	8.3	8.6	10.1	10.8	8.3	7.7
	1.24	1.47	1.42	1.24	0.76	0.75	1.38	1.69	1.55	1.71	1.89	1.47	1.42
200	5.3	6.5	7.3	6.2	2.2	2.2	7.5	9.1	9.4	10.9	11.7	9.0	8.4
	1.18	1.39	1.35	1.18	0.73	0.73	1.31	1.60	1.48	1.65	1.82	1.41	1.37
Freq	5.3	10.0	9.0	5.5	3.3	2.9	6.1	10.6	9.9	13.1	15.9	8.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	3.2	3.7	2.5	0.6	1.4	3.9	4.5	4.8	5.7	6.0	3.4	4.2
	1.04	1.23	1.18	0.94	0.60	0.74	1.22	1.39	1.31	1.50	1.63	1.03	1.22
25	2.8	3.9	4.4	3.1	0.8	1.8	4.7	5.4	5.7	6.8	7.2	4.1	5.0
	1.12	1.32	1.26	1.00	0.63	0.78	1.31	1.50	1.38	1.57	1.72	1.10	1.28
50	3.4	4.6	5.2	3.7	1.0	2.2	5.5	6.3	6.6	7.7	8.2	4.9	5.8
	1.24	1.48	1.39	1.10	0.69	0.86	1.47	1.69	1.51	1.69	1.85	1.21	1.39
100	4.1	5.5	6.2	4.4	1.3	2.7	6.6	7.6	7.8	8.9	9.5	5.8	6.9
	1.32	1.57	1.48	1.17	0.73	0.91	1.56	1.79	1.62	1.81	1.99	1.29	1.48
200	5.0	6.8	7.6	5.4	1.6	3.2	8.2	9.4	9.3	10.6	11.3	7.1	8.3
	1.26	1.50	1.42	1.12	0.70	0.88	1.49	1.71	1.55	1.75	1.92	1.24	1.44
Freq	5.3	11.2	8.2	4.6	3.0	3.0	7.0	11.6	9.6	14.2	15.9	6.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.9	3.2	2.1	0.5	1.7	3.5	3.9	4.2	5.0	5.2	2.8	3.6
	1.08	1.25	1.17	0.92	0.57	0.85	1.25	1.39	1.31	1.51	1.61	1.00	1.22
25	2.7	3.6	3.9	2.7	0.6	2.2	4.3	4.9	5.2	6.1	6.4	3.5	4.5
	1.15	1.34	1.23	0.97	0.60	0.90	1.34	1.48	1.38	1.58	1.68	1.06	1.28
50	3.3	4.3	4.7	3.2	0.8	2.7	5.1	5.8	6.1	7.1	7.4	4.3	5.3
	1.27	1.48	1.34	1.05	0.64	0.99	1.48	1.64	1.48	1.68	1.79	1.15	1.37
100	4.0	5.2	5.6	3.9	1.1	3.3	6.2	7.0	7.2	8.3	8.6	5.2	6.3
	1.38	1.62	1.47	1.14	0.69	1.08	1.62	1.80	1.62	1.85	1.97	1.26	1.49
200	4.8	6.4	6.8	4.7	1.3	4.0	7.6	8.6	8.6	9.8	10.2	6.3	7.6
	1.33	1.55	1.41	1.10	0.67	1.04	1.55	1.72	1.56	1.78	1.90	1.21	1.45
Freq	5.9	10.9	7.9	4.5	2.9	3.4	7.4	11.4	10.0	14.4	15.1	6.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	2.3	2.5	1.5	0.5	1.8	2.8	3.1	3.4	4.0	4.0	2.1	2.9
	1.13	1.24	1.17	0.88	0.60	0.99	1.30	1.36	1.35	1.54	1.58	0.98	1.23
25	2.4	3.0	3.3	2.0	0.6	2.4	3.7	4.1	4.5	5.2	5.3	2.8	3.8
	1.19	1.31	1.23	0.92	0.62	1.04	1.37	1.44	1.41	1.60	1.64	1.03	1.28
50	3.0	3.7	4.0	2.5	0.9	2.9	4.6	5.0	5.4	6.2	6.3	3.5	4.6
	1.29	1.41	1.32	0.98	0.67	1.12	1.49	1.56	1.49	1.68	1.73	1.11	1.36
100	3.7	4.6	4.9	3.2	1.1	3.7	5.6	6.1	6.5	7.4	7.5	4.3	5.6
	1.46	1.60	1.49	1.10	0.74	1.27	1.69	1.77	1.65	1.85	1.90	1.25	1.49
200	4.5	5.6	5.9	3.8	1.3	4.4	6.8	7.4	7.8	8.8	8.9	5.3	6.7
	1.40	1.55	1.44	1.07	0.71	1.23	1.63	1.71	1.63	1.83	1.88	1.21	1.47
Freq	6.7	10.5	7.4	4.3	2.9	3.9	8.0	11.1	10.6	14.6	13.9	6.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.6	323	3.9	140	3.4	92	2.7	44
25	6.1	409	4.6	214	4.2	156	3.5	93
50	6.5	484	5.3	281	4.9	218	4.2	145
100	7.0	627	6.2	407	5.7	313	5.0	213
200	7.7	871	7.5	759	6.9	577	6.1	381

Bolzano

46° 28′ 00″ N 11° 20′ 00″ E	UTM 32 E 679156 m N 5148643 m	241 m a.s.l.

Location in a valley in the Dolomite Alps. The nearest mountains are about 1 km to the E and 3 km to the W. The city of Bolzano lies 4-5 km away in the sectors N and NE.
The station is situated in an airport and the anemometer is mounted on a 4 m mast on top of a 6-m high building. There are several obstacles - buildings, hangars and trees - at a distance of 80-350 m, in the sector 10°-190°. Some buildings are also present between 240° and 300° at a distance of 500-600 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	1600	0.10										
30	0.05	100	0.40	450	0.05	1000	0.40						
60	0.40	100	0.20										
90	0.40	100	0.20										
120	0.40	200	0.20										
150	0.40	250	0.05	750	0.20								
180	0.40	500	0.05	1000	0.20								
210	0.05	1000	0.20										
240	0.05	500	0.40	650	0.05	1050	0.20						
270	0.05	500	0.30	750	0.05	1250	0.20						
300	0.05	400	0.30	600	0.05	1100	0.20						
330	0.50	1000	0.40										

Height of anemometer: 6.0 m a.g.l. Period: 66010100-75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.0	842	38	29	22	18	9	12	14	7	6	3	0	0	0	0.3	0.48
30	10.2	666	46	56	57	49	40	32	27	14	11	2	0	0	0	1.4	0.78
60	8.4	772	30	40	40	38	32	22	14	6	4	1	0	0	0	0.7	0.61
90	7.1	955	10	12	9	5	2	4	2	0	0	0	0	0	0	0.7	0.88
120	6.7	982	6	4	4	2	2	0	1	0	0	0	0	0	0	0.7	1.12
150	7.4	868	50	39	24	13	2	1	1	1	0	0	0	0	0	0.7	0.80
180	15.6	467	158	138	109	62	35	19	8	4	1	0	0	0	0	2.0	1.14
210	9.2	747	98	65	33	23	14	8	7	2	3	0	0	0	0	0.7	0.66
240	6.6	977	15	6	1	1	0	0	0	0	0	0	0	0	0	0.6	1.75
270	7.1	988	7	3	1	0	0	0	0	0	0	0	0	0	0	0.6	2.40
300	6.6	979	9	4	2	2	2	1	1	0	2	0	0	0	0	0.7	0.89
330	7.2	890	31	21	18	16	10	6	3	2	3	0	0	0	0	0.5	0.62
Total	100.0	803	53	45	35	24	16	11	8	4	3	1	0	0	0	0.5	0.57

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	0.3	0.4	0.4	0.5	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.3
3	0.2	0.3	0.3	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.2	0.2	0.2
6	0.2	0.2	0.3	0.3	0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.2	0.2
9	0.2	0.3	0.4	0.6	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.2
12	0.3	0.6	1.3	1.9	1.6	1.6	1.7	1.0	0.6	0.5	0.3	0.5	1.0
15	0.4	1.2	2.6	3.1	3.2	2.7	2.8	1.9	1.6	0.8	0.5	0.5	1.8
18	0.4	1.0	2.4	3.2	3.0	2.4	2.4	1.7	1.0	0.4	0.3	0.4	1.6
21	0.3	0.6	0.9	1.2	0.8	0.7	0.8	0.4	0.3	0.2	0.3	0.3	0.6
Day	0.3	0.6	1.1	1.4	1.2	1.0	1.1	0.7	0.5	0.3	0.3	0.3	0.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.1	2.1	2.2	0.8	1.6	1.7	4.0	3.1	1.5	1.1	1.3	1.4	1.8
	0.64	0.72	0.73	0.56	1.16	1.02	1.17	1.06	0.93	1.89	1.09	0.73	0.77
25	1.3	2.3	2.4	0.9	1.8	1.8	4.3	3.5	1.6	1.3	1.4	1.6	2.0
	0.65	0.72	0.74	0.57	1.19	1.05	1.21	1.09	0.96	1.95	1.12	0.74	0.78
50	1.4	2.5	2.6	0.9	2.0	2.0	4.7	3.8	1.8	1.4	1.6	1.7	2.2
	0.67	0.73	0.75	0.58	1.23	1.07	1.24	1.11	0.98	2.00	1.15	0.76	0.80
100	1.5	2.6	2.8	1.0	2.1	2.1	5.1	4.0	1.9	1.5	1.7	1.8	2.4
	0.66	0.73	0.75	0.57	1.19	1.04	1.21	1.08	0.95	1.94	1.12	0.74	0.79
200	1.5	2.8	2.9	1.0	2.3	2.3	5.5	4.4	2.1	1.6	1.8	1.9	2.6
	0.64	0.72	0.73	0.56	1.13	0.99	1.14	1.03	0.91	1.83	1.06	0.71	0.78
Freq	7.8	9.3	9.1	7.6	6.9	7.1	12.2	11.9	7.7	6.8	6.8	6.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.8	1.9	1.3	1.0	1.1	1.2	3.1	1.5	0.8	0.8	0.9	1.1	1.3
	0.62	0.74	0.65	0.74	1.01	0.89	1.11	0.80	0.87	1.54	0.87	0.67	0.72
25	1.1	2.3	1.5	1.3	1.3	1.5	3.8	1.9	1.0	1.0	1.1	1.4	1.6
	0.65	0.76	0.66	0.79	1.08	0.95	1.19	0.86	0.93	1.66	0.93	0.71	0.76
50	1.3	2.7	1.7	1.6	1.6	1.8	4.5	2.3	1.3	1.1	1.3	1.7	1.9
	0.71	0.79	0.68	0.87	1.21	1.06	1.33	0.95	1.03	1.86	1.04	0.77	0.81
100	1.6	3.1	2.1	2.0	1.9	2.2	5.4	2.8	1.5	1.4	1.5	2.1	2.4
	0.75	0.84	0.72	0.92	1.28	1.12	1.41	1.00	1.09	1.98	1.10	0.81	0.86
200	1.9	3.5	2.3	2.4	2.3	2.7	6.6	3.4	1.9	1.7	1.9	2.5	2.9
	0.73	0.82	0.70	0.88	1.23	1.07	1.35	0.96	1.04	1.89	1.05	0.78	0.85
Freq	8.1	9.7	8.6	7.3	6.7	7.3	14.2	10.4	7.0	7.0	6.7	6.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.5	1.8	1.1	0.8	0.9	1.0	2.8	1.1	0.8	0.7	0.8	1.1	1.1
	0.55	0.77	0.65	0.73	1.02	0.85	1.14	0.76	1.08	1.69	0.88	0.70	0.72
25	0.6	2.3	1.4	1.0	1.2	1.3	3.5	1.4	1.0	0.9	1.0	1.4	1.4
	0.56	0.79	0.67	0.77	1.09	0.90	1.22	0.81	1.15	1.81	0.93	0.73	0.75
50	0.8	2.6	1.6	1.3	1.4	1.5	4.2	1.7	1.1	1.0	1.2	1.7	1.7
	0.59	0.81	0.69	0.84	1.19	0.98	1.34	0.88	1.27	2.00	1.02	0.79	0.79
100	1.0	3.1	1.9	1.6	1.7	1.9	5.1	2.2	1.4	1.2	1.5	2.1	2.1
	0.63	0.87	0.73	0.91	1.31	1.07	1.47	0.95	1.39	2.19	1.11	0.85	0.85
200	1.1	3.6	2.2	1.9	2.1	2.3	6.3	2.6	1.7	1.5	1.8	2.5	2.6
	0.62	0.85	0.72	0.88	1.25	1.02	1.41	0.92	1.33	2.10	1.07	0.82	0.84
Freq	8.3	9.9	8.5	7.2	6.7	7.4	14.9	9.9	6.7	7.1	6.6	6.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.3	1.5	0.8	0.7	0.8	0.6	2.2	0.6	0.6	0.6	0.7	0.7	0.8
	0.51	0.77	0.63	0.87	1.04	0.67	1.13	0.65	2.03	1.87	0.92	0.64	0.71
25	0.4	1.9	1.0	1.0	1.0	0.8	2.9	0.8	0.8	0.8	1.0	0.9	1.1
	0.52	0.79	0.65	0.92	1.10	0.70	1.19	0.69	2.15	1.98	0.97	0.66	0.73
50	0.6	2.3	1.3	1.2	1.3	1.0	3.6	1.0	1.0	1.0	1.2	1.1	1.4
	0.54	0.81	0.67	0.99	1.19	0.75	1.29	0.73	2.33	2.15	1.04	0.69	0.76
100	0.7	2.8	1.6	1.5	1.6	1.3	4.4	1.3	1.2	1.2	1.5	1.5	1.8
	0.56	0.86	0.70	1.11	1.35	0.84	1.46	0.81	2.66	2.45	1.18	0.75	0.81
200	0.8	3.3	1.8	1.9	1.9	1.6	5.4	1.5	1.5	1.5	1.9	1.7	2.2
	0.56	0.87	0.70	1.07	1.30	0.81	1.41	0.79	2.56	2.36	1.14	0.74	0.82
Freq	7.9	10.0	8.3	7.0	6.8	7.8	15.6	8.9	6.7	7.0	6.3	7.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	2.1	77	1.6	40	1.4	26	1.1	12
25	2.3	95	1.9	58	1.7	43	1.4	25
50	2.5	110	2.2	70	2.0	56	1.7	38
100	2.7	142	2.6	93	2.3	74	2.0	52
200	3.0	201	3.1	177	2.8	135	2.4	89

Brindisi

40° 39′ 00″ N 17° 57′ 00″ E	UTM 33 E 749435 m N 4504168 m	15 m a.s.l.

Location at the SE coast of Italy in the Puglia region. The terrain is flat with cereal cultivation and scattered farm houses. The distance to the coast is between 300 m and 2.5 km in the directions from NW to SSE.
The anemometer is placed between the runways of the airport of Brindisi. The town of Brindisi lies to the S at a distance of approx. 2 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.01	2000	0.00								
30	0.01	900	0.00										
60	0.03	300	0.00										
90	0.05	1300	0.00	1800	0.05	2100	0.00						
120	0.05	1300	0.00										
150	0.05	1300	0.00	2000	0.10								
180	0.05	2000	0.20	4000	0.10								
210	0.05	2500	0.20	3500	0.10								
240	0.10												
270	0.10												
300	0.05												
330	0.05	2500	0.00										

Height of anemometer: 6.0 m a.g.l. Period: 65010103–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	11.2	144	31	93	127	113	109	89	79	51	84	46	23	6	6	6.2	1.63
30	7.4	226	46	119	141	96	77	57	56	43	64	41	25	7	2	5.0	1.31
60	4.4	394	56	150	142	72	54	27	34	18	29	14	8	2	1	3.3	1.11
90	4.1	407	43	130	163	98	61	31	23	14	17	11	2	1	0	3.3	1.28
120	4.9	353	46	97	128	121	77	47	35	28	39	19	8	1	1	4.1	1.30
150	9.6	182	57	135	148	130	86	63	66	34	54	28	12	3	3	4.9	1.42
180	10.7	173	43	117	137	114	97	71	70	44	75	42	11	5	2	5.5	1.51
210	7.4	244	48	134	159	105	93	68	47	28	45	22	5	2	0	4.4	1.42
240	5.7	310	81	193	159	87	57	32	25	18	22	9	4	1	2	3.3	1.20
270	6.1	306	92	194	163	75	53	44	25	15	22	8	3	2	0	3.3	1.24
300	10.2	177	44	117	135	137	109	79	69	49	51	24	7	3	0	5.2	1.67
330	18.3	97	27	74	119	124	124	106	100	69	94	45	13	4	4	6.6	1.93
Total	100.0	210	47	120	139	112	92	70	63	41	60	31	11	4	2	5.0	1.44

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.4	3.8	3.5	2.8	2.4	3.1	2.7	2.9	3.4	4.0	4.4	3.5
3	5.0	4.3	4.0	3.4	2.9	2.4	3.2	2.9	3.2	3.5	3.9	4.4	3.6
6	4.7	4.5	4.0	3.7	3.5	3.5	3.9	3.3	3.3	3.7	4.0	4.5	3.9
9	5.2	5.5	5.6	5.5	5.6	5.2	5.2	5.0	4.8	4.9	4.9	5.0	5.2
12	6.2	6.4	6.1	6.3	6.1	5.7	5.9	5.5	5.3	5.4	5.7	5.6	5.8
15	5.4	5.9	5.9	5.9	5.6	5.2	5.6	5.1	5.0	4.8	5.0	5.1	5.4
18	4.6	4.7	4.3	4.1	4.0	3.6	4.0	3.6	3.2	3.5	4.0	4.2	4.0
21	4.7	4.4	4.0	3.5	2.9	2.7	3.0	2.7	2.7	3.4	4.1	4.3	3.5
Day	5.1	5.0	4.7	4.5	4.2	3.8	4.2	3.9	3.8	4.1	4.4	4.7	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.4	6.5	4.3	4.4	5.4	8.0	9.1	7.9	6.6	6.2	8.4	9.2	7.6
	1.69	1.38	1.13	1.25	1.29	1.56	1.62	1.60	1.40	1.40	1.81	1.90	1.53
25	9.2	7.1	4.7	4.8	5.9	8.7	9.9	8.7	7.2	6.8	9.2	10.1	8.3
	1.73	1.41	1.17	1.29	1.33	1.58	1.64	1.63	1.42	1.43	1.85	1.93	1.56
50	9.8	7.6	5.1	5.2	6.4	9.3	10.6	9.3	7.7	7.3	9.9	10.7	8.9
	1.77	1.45	1.20	1.32	1.37	1.62	1.67	1.67	1.46	1.47	1.90	1.98	1.59
100	10.5	8.2	5.5	5.7	6.9	9.9	11.3	9.9	8.2	7.8	10.6	11.5	9.6
	1.74	1.42	1.16	1.28	1.33	1.60	1.66	1.65	1.44	1.44	1.86	1.94	1.57
200	11.4	8.9	6.0	6.2	7.5	10.6	12.1	10.7	8.8	8.5	11.4	12.4	10.3
	1.68	1.37	1.10	1.22	1.26	1.55	1.63	1.60	1.39	1.39	1.80	1.88	1.53
Freq	12.4	8.0	4.9	4.1	4.8	8.8	10.5	7.9	6.0	6.0	9.6	17.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.0	2.6	3.1	3.9	5.8	6.6	5.3	4.4	4.5	6.3	6.5	5.3
	1.43	1.13	0.96	1.09	1.13	1.43	1.51	1.44	1.21	1.27	1.72	1.69	1.38
25	6.7	4.8	3.2	3.8	4.7	6.8	7.7	6.3	5.2	5.3	7.4	7.7	6.3
	1.49	1.19	1.03	1.17	1.20	1.48	1.55	1.50	1.26	1.34	1.79	1.77	1.44
50	7.6	5.6	3.8	4.5	5.6	7.7	8.7	7.2	6.0	6.1	8.4	8.7	7.2
	1.60	1.30	1.15	1.31	1.32	1.56	1.61	1.60	1.35	1.44	1.92	1.88	1.53
100	8.8	6.7	4.6	5.4	6.6	8.8	9.8	8.3	6.9	7.1	9.6	10.0	8.4
	1.71	1.39	1.22	1.39	1.41	1.67	1.73	1.72	1.44	1.54	2.06	2.02	1.63
200	10.3	8.0	5.7	6.6	8.0	10.2	11.2	9.8	8.1	8.5	11.4	11.7	9.8
	1.66	1.34	1.17	1.33	1.35	1.62	1.68	1.66	1.40	1.49	1.99	1.96	1.60
Freq	10.9	7.2	4.3	4.2	5.2	9.6	10.5	7.3	5.7	6.4	10.9	17.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	3.4	2.3	2.7	3.6	5.1	5.7	4.5	3.8	4.1	5.5	5.7	4.7
	1.42	1.12	0.98	1.08	1.15	1.44	1.50	1.40	1.23	1.33	1.75	1.69	1.38
25	5.9	4.3	2.9	3.4	4.5	6.2	6.9	5.6	4.7	5.0	6.7	6.9	5.7
	1.48	1.18	1.04	1.15	1.21	1.48	1.54	1.46	1.28	1.39	1.81	1.76	1.44
50	6.8	5.1	3.5	4.1	5.3	7.2	7.8	6.4	5.5	5.9	7.8	8.0	6.6
	1.56	1.27	1.14	1.26	1.30	1.55	1.60	1.54	1.36	1.48	1.92	1.86	1.52
100	8.0	6.1	4.3	5.0	6.3	8.3	9.0	7.5	6.5	6.9	9.0	9.2	7.7
	1.71	1.40	1.24	1.38	1.42	1.68	1.71	1.69	1.48	1.62	2.11	2.03	1.65
200	9.4	7.3	5.3	6.1	7.5	9.5	10.3	8.8	7.6	8.2	10.6	10.8	9.1
	1.65	1.35	1.19	1.32	1.37	1.64	1.69	1.64	1.44	1.57	2.04	1.98	1.61
Freq	10.6	6.9	4.3	4.2	5.6	9.7	10.2	7.1	5.8	6.8	11.6	17.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	2.6	1.8	2.2	3.0	4.1	4.4	3.5	3.0	3.4	4.4	4.4	3.7
	1.40	1.11	0.99	1.09	1.17	1.46	1.51	1.41	1.24	1.38	1.80	1.67	1.40
25	4.8	3.5	2.5	3.0	3.9	5.3	5.7	4.6	4.0	4.4	5.8	5.7	4.8
	1.44	1.16	1.04	1.15	1.22	1.50	1.54	1.46	1.29	1.44	1.86	1.73	1.44
50	5.8	4.3	3.1	3.6	4.8	6.3	6.7	5.6	4.8	5.3	6.9	6.8	5.8
	1.52	1.24	1.13	1.24	1.29	1.55	1.59	1.53	1.35	1.51	1.96	1.81	1.51
100	6.9	5.2	3.8	4.5	5.7	7.4	7.9	6.6	5.7	6.4	8.1	8.1	6.9
	1.65	1.38	1.27	1.40	1.41	1.65	1.68	1.66	1.48	1.65	2.12	1.96	1.63
200	8.2	6.3	4.6	5.5	6.8	8.7	9.2	7.8	6.8	7.6	9.6	9.5	8.1
	1.65	1.35	1.23	1.36	1.40	1.67	1.71	1.66	1.47	1.64	2.12	1.97	1.63
Freq	10.2	6.5	4.2	4.3	6.2	9.8	9.8	6.9	5.8	7.3	12.5	16.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.9	525	4.9	222	4.3	145	3.4	70
25	7.5	664	5.8	340	5.2	248	4.4	147
50	8.0	783	6.5	450	6.0	349	5.2	232
100	8.6	982	7.5	618	6.9	484	6.1	341
200	9.3	1300	8.8	1045	8.2	816	7.3	564

Cagliari

39° 15′ 00″ N 09° 03′ 00″ E	UTM 32 E 504314 m N 4344594 m	18 m a.s.l.

At the southern end of the Campidano valley at Cagliari airport. Approximately 10 km north of the Mediterranean coast and 2 km west of the city of Cagliari. The terrain is open and flat in all directions.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	1000	0.20										
30	0.05	1000	0.20										
60	0.05	1000	0.20										
90	0.05	1000	0.20	3000	0.40								
120	0.05	1000	0.00	3000	0.40								
150	0.05	1500	0.00	2500	0.005	3500	0.00						
180	0.05	1000	0.00	2500	0.005	6500	0.00						
210	0.05	1000	0.00	4000	0.005								
240	0.05	1000	0.00	4000	0.0005	7000	0.20						
270	0.05	1000	0.00	4000	0.20								
300	0.05	500	0.00	2500	0.20								
330	0.05	1000	0.20										

Height of anemometer: 6.5 m a.g.l. Period: 51010100–70123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	10.6	156	120	175	166	112	92	60	56	25	30	6	1	1	0	4.1	1.54
30	3.3	390	171	164	124	76	40	18	8	3	4	2	0	0	1	2.4	1.12
60	2.1	594	120	116	65	31	29	16	12	9	8	1	0	0	0	1.5	0.85
90	3.6	347	107	141	120	75	60	44	48	25	24	8	0	0	0	3.3	1.22
120	5.7	216	80	108	123	98	88	85	82	50	57	9	2	0	0	4.8	1.63
150	10.6	125	60	102	143	142	141	118	82	43	39	5	0	0	0	5.3	2.19
180	10.7	131	70	121	147	144	125	114	79	37	28	4	0	0	0	5.0	2.09
210	3.2	389	92	113	107	87	74	60	41	17	16	1	2	1	2	3.2	1.19
240	2.0	604	80	78	53	47	30	17	28	23	26	9	4	0	0	1.7	0.78
270	5.2	240	89	78	76	73	78	84	93	57	89	26	13	3	0	5.5	1.60
300	15.6	113	105	146	143	105	83	81	75	46	67	22	9	4	0	5.1	1.54
330	27.3	83	111	158	165	106	82	71	73	41	68	28	11	4	0	5.1	1.48
Total	100.0	171	99	137	141	107	90	77	68	38	49	15	5	2	0	4.7	1.51

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.2	3.7	3.4	3.4	3.3	3.2	3.2	3.2	2.5	2.6	2.8	3.4	3.2
3	3.4	3.4	3.3	3.3	3.4	3.0	3.0	3.0	2.4	2.7	2.9	3.4	3.1
6	3.3	3.4	3.3	3.1	3.1	3.0	2.9	2.9	2.4	2.7	3.0	3.5	3.1
9	3.4	3.6	4.0	4.4	4.3	4.1	3.8	4.0	3.1	3.0	3.1	3.5	3.7
12	4.5	5.3	5.6	5.8	5.7	5.8	6.0	6.0	5.0	4.6	4.3	4.8	5.3
15	5.1	6.1	6.3	6.6	6.4	6.6	6.7	6.7	6.1	5.3	5.0	5.1	6.0
18	3.9	4.7	5.1	5.5	5.6	5.6	5.7	5.9	5.0	4.1	3.5	4.0	4.9
21	3.4	3.9	3.8	4.0	3.9	3.8	4.1	4.0	3.3	2.8	2.9	3.5	3.6
Day	3.8	4.3	4.4	4.5	4.5	4.4	4.4	4.4	3.7	3.5	3.4	3.9	4.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	6.0	3.4	5.5	7.6	7.3	6.9	6.4	3.6	8.0	8.1	8.7	7.5
	1.63	1.56	1.13	1.32	1.80	2.07	2.11	1.88	1.07	1.68	1.78	1.62	1.61
25	8.6	6.6	3.8	6.0	8.3	8.0	7.6	7.0	4.0	8.7	8.8	9.5	8.2
	1.66	1.61	1.17	1.35	1.85	2.13	2.18	1.94	1.10	1.71	1.82	1.64	1.64
50	9.2	7.1	4.1	6.5	8.9	8.6	8.1	7.5	4.3	9.3	9.4	10.2	8.7
	1.70	1.65	1.20	1.38	1.90	2.19	2.23	1.99	1.12	1.76	1.87	1.67	1.68
100	9.8	7.7	4.4	6.9	9.5	9.3	8.8	8.1	4.7	10.0	10.1	10.8	9.4
	1.67	1.60	1.16	1.35	1.85	2.12	2.16	1.93	1.09	1.73	1.83	1.66	1.66
200	10.6	8.4	4.8	7.5	10.4	10.3	9.8	9.0	5.0	10.8	11.0	11.6	10.2
	1.62	1.52	1.11	1.30	1.77	2.01	2.05	1.83	1.04	1.67	1.77	1.62	1.62
Freq	15.0	5.3	2.4	3.2	5.2	9.4	10.7	5.1	2.3	4.4	12.9	24.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	3.2	1.9	4.1	5.5	5.0	4.7	3.5	1.9	6.0	5.6	6.3	5.2
	1.53	1.16	0.88	1.23	1.65	1.83	1.75	1.19	0.80	1.60	1.55	1.47	1.42
25	6.2	3.9	2.3	4.9	6.5	6.0	5.7	4.2	2.3	7.1	6.6	7.3	6.2
	1.62	1.25	0.94	1.29	1.75	1.97	1.89	1.27	0.84	1.67	1.63	1.51	1.49
50	7.1	4.6	2.8	5.7	7.5	7.0	6.6	5.0	2.7	8.0	7.5	8.3	7.1
	1.77	1.40	1.04	1.40	1.91	2.22	2.12	1.42	0.90	1.79	1.75	1.58	1.60
100	8.3	5.5	3.4	6.7	8.8	8.3	7.8	6.0	3.3	9.2	8.7	9.4	8.2
	1.90	1.48	1.10	1.50	2.05	2.36	2.26	1.51	0.96	1.92	1.88	1.69	1.73
200	10.0	6.8	4.2	8.0	10.6	10.3	9.7	7.4	3.9	10.8	10.3	10.8	9.8
	1.83	1.42	1.06	1.44	1.97	2.25	2.16	1.45	0.93	1.86	1.81	1.65	1.70
Freq	11.1	3.5	2.1	3.6	5.7	10.6	10.7	3.3	2.0	5.1	15.4	26.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	2.6	1.8	3.7	4.8	4.3	4.1	2.9	2.1	5.1	4.9	5.4	4.5
	1.54	1.12	0.89	1.27	1.69	1.82	1.73	1.14	0.87	1.59	1.55	1.48	1.43
25	5.5	3.2	2.3	4.6	5.9	5.4	5.1	3.7	2.6	6.2	6.0	6.6	5.6
	1.62	1.20	0.95	1.33	1.79	1.95	1.85	1.22	0.91	1.65	1.62	1.52	1.49
50	6.4	3.9	2.8	5.4	6.8	6.3	5.9	4.4	3.1	7.2	7.0	7.6	6.5
	1.76	1.32	1.04	1.43	1.95	2.15	2.05	1.34	0.96	1.75	1.72	1.58	1.58
100	7.6	4.7	3.4	6.4	8.1	7.5	7.1	5.3	3.7	8.4	8.1	8.7	7.6
	1.94	1.44	1.13	1.57	2.14	2.37	2.25	1.47	1.05	1.91	1.88	1.69	1.73
200	9.2	5.8	4.1	7.7	9.8	9.3	8.8	6.5	4.4	9.9	9.6	10.0	9.1
	1.86	1.38	1.09	1.51	2.06	2.26	2.15	1.41	1.02	1.85	1.82	1.67	1.71
Freq	10.2	3.2	2.2	3.8	6.1	10.6	10.1	3.1	2.2	5.9	16.1	26.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	2.0	1.7	3.1	3.8	3.4	3.2	2.2	2.2	3.9	3.9	4.3	3.6
	1.54	1.10	0.95	1.33	1.77	1.81	1.69	1.12	1.02	1.57	1.55	1.49	1.44
25	4.6	2.6	2.2	4.1	4.9	4.5	4.2	3.0	2.9	5.1	5.1	5.6	4.7
	1.62	1.17	1.00	1.39	1.87	1.92	1.78	1.18	1.05	1.62	1.60	1.52	1.50
50	5.5	3.3	2.8	4.9	6.0	5.4	5.1	3.7	3.6	6.1	6.1	6.6	5.6
	1.73	1.26	1.08	1.48	2.03	2.08	1.94	1.27	1.10	1.71	1.68	1.58	1.58
100	6.6	4.0	3.5	5.9	7.2	6.5	6.2	4.5	4.3	7.2	7.3	7.7	6.7
	1.94	1.43	1.22	1.64	2.30	2.37	2.21	1.44	1.20	1.87	1.82	1.67	1.72
200	8.0	4.9	4.2	7.1	8.7	8.0	7.5	5.5	5.1	8.6	8.6	9.0	8.0
	1.89	1.38	1.18	1.61	2.22	2.28	2.13	1.39	1.19	1.86	1.82	1.70	1.73
Freq	9.3	3.1	2.4	4.0	6.7	10.7	9.2	3.0	2.6	7.3	17.5	24.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.7	451	4.7	189	4.1	124	3.2	60
25	7.3	573	5.6	291	5.0	214	4.2	126
50	7.8	679	6.4	390	5.8	302	5.1	200
100	8.4	856	7.3	544	6.8	428	6.0	298
200	9.1	1143	8.8	943	8.1	731	7.2	501

Campeda

40° 21′ 00″ N	08° 45′ 00″ E	UTM 32	E 478768 m	N 4466712 m	660 m a.s.l.

Location on a plateau about 40 km from the west coast of Sardinia. The terrain is open in all directions, with hedges, isolated trees and scattered houses. Individual properties are separated by 1-m high walls. The nearest mountains (approx. 1000 m high) are at a distance of 10–15 km in directions E–SE. The plateau slopes down steeply in directions N–NW at 1.5 km from the station.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05												
30	0.03												
60	0.03												
90	0.03												
120	0.03	3000	0.05										
150	0.03												
180	0.03												
210	0.03												
240	0.05												
270	0.05												
300	0.05												
330	0.05	2000	0.10	3000	0.05								

Height of anemometer: 15.0 m a.g.l. Period: 80041012–86020318

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.4	213	255	212	136	77	45	22	16	8	12	2	1	1	0	2.8	1.26
30	9.1	178	207	179	142	85	63	53	29	25	27	9	2	2	0	3.5	1.25
60	8.0	204	193	163	144	105	69	47	27	16	19	11	2	0	0	3.5	1.34
90	8.2	175	198	213	162	73	69	44	30	12	14	5	3	1	0	3.3	1.30
120	6.0	237	221	177	100	102	48	42	19	19	20	11	2	0	2	3.0	1.12
150	10.5	121	116	121	130	132	139	80	50	33	53	18	5	1	0	5.1	1.75
180	5.3	81	161	225	201	143	77	60	23	15	11	1	1	0	0	3.9	1.76
210	6.0	111	168	207	167	118	77	50	24	31	24	15	5	3	0	3.9	1.35
240	9.1	111	146	128	146	140	121	83	34	36	32	16	5	2	0	4.7	1.65
270	12.3	90	107	135	152	149	112	75	63	37	50	20	8	0	1	5.1	1.66
300	11.0	95	117	120	122	110	82	82	75	55	80	37	16	6	5	5.7	1.52
330	7.2	233	216	150	124	72	58	46	38	26	17	13	7	0	0	3.3	1.16
Total	100.0	149	168	162	142	111	84	60	39	28	34	15	5	1	1	4.1	1.37

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.8	4.0	3.4	3.4	3.7	2.7	2.6	2.8	3.0	3.5	3.3	4.1	3.4
3	4.6	3.4	3.6	3.4	3.5	2.7	2.5	2.4	2.9	3.5	3.4	3.8	3.3
6	4.5	3.8	3.5	3.4	3.4	2.5	2.3	2.6	2.8	3.5	3.4	4.1	3.3
9	5.0	4.0	4.1	4.3	4.1	3.5	3.1	3.2	3.3	3.8	3.6	4.3	3.8
12	5.7	4.8	4.5	5.0	4.7	3.9	4.0	4.2	4.1	4.7	4.1	5.0	4.5
15	5.6	4.4	4.5	4.8	4.7	4.4	4.6	4.8	4.6	4.5	3.6	4.3	4.6
18	4.6	3.5	3.3	3.6	3.4	3.0	2.7	3.2	3.1	3.3	3.1	4.2	3.4
21	5.1	3.5	3.3	3.1	3.3	2.3	2.2	2.5	2.9	3.2	3.6	4.2	3.2
Day	5.0	3.9	3.8	3.9	3.8	3.1	3.0	3.2	3.3	3.8	3.5	4.3	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.6	4.7	4.6	4.3	6.4	5.7	5.3	6.4	7.1	7.7	5.7	5.7
	1.39	1.42	1.51	1.52	1.38	1.89	1.88	1.62	1.83	1.92	1.71	1.40	1.54
25	4.6	5.0	5.2	5.0	4.8	7.0	6.2	5.8	7.1	7.7	8.4	6.3	6.2
	1.43	1.46	1.56	1.57	1.42	1.95	1.94	1.67	1.89	1.98	1.74	1.44	1.58
50	4.9	5.4	5.6	5.4	5.1	7.6	6.7	6.3	7.6	8.3	9.0	6.8	6.7
	1.47	1.50	1.60	1.61	1.46	2.00	1.99	1.72	1.94	2.03	1.79	1.47	1.62
100	5.3	5.8	6.0	5.8	5.6	8.2	7.2	6.8	8.2	9.0	9.6	7.3	7.2
	1.42	1.45	1.55	1.56	1.41	1.94	1.93	1.67	1.88	1.97	1.75	1.44	1.58
200	5.8	6.4	6.6	6.4	6.1	9.0	7.9	7.5	9.1	9.9	10.5	7.9	7.9
	1.35	1.38	1.47	1.48	1.34	1.83	1.83	1.58	1.77	1.86	1.69	1.37	1.52
Freq	7.3	8.7	8.3	8.1	6.6	9.4	6.7	5.8	8.3	11.4	11.4	8.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	3.2	3.2	3.1	2.8	4.7	3.6	3.7	4.6	4.9	5.5	3.2	3.9
	1.23	1.21	1.30	1.28	1.12	1.69	1.68	1.33	1.60	1.62	1.49	1.13	1.33
25	3.3	3.9	3.9	3.7	3.5	5.6	4.3	4.4	5.5	5.9	6.5	3.9	4.7
	1.32	1.31	1.40	1.38	1.20	1.82	1.81	1.44	1.72	1.74	1.56	1.22	1.42
50	3.9	4.6	4.6	4.4	4.1	6.5	5.1	5.2	6.4	6.9	7.5	4.6	5.5
	1.48	1.46	1.56	1.54	1.34	2.05	2.04	1.61	1.93	1.96	1.67	1.36	1.56
100	4.7	5.5	5.5	5.2	4.9	7.7	6.0	6.2	7.6	8.2	8.6	5.6	6.5
	1.57	1.55	1.67	1.64	1.42	2.18	2.17	1.71	2.06	2.08	1.79	1.45	1.67
200	5.8	6.8	6.8	6.5	6.1	9.6	7.5	7.7	9.5	10.2	10.2	6.9	8.1
	1.50	1.49	1.59	1.57	1.36	2.08	2.07	1.63	1.97	1.99	1.73	1.38	1.62
Freq	7.4	9.1	8.0	8.2	6.0	10.4	5.4	6.0	9.0	12.2	11.0	7.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.8	2.8	2.7	2.7	4.0	3.1	3.2	4.0	4.3	4.8	2.8	3.4
	1.24	1.24	1.31	1.29	1.19	1.69	1.65	1.34	1.60	1.60	1.49	1.14	1.35
25	3.1	3.5	3.5	3.4	3.4	5.0	3.9	4.0	5.0	5.3	5.8	3.5	4.3
	1.33	1.32	1.40	1.38	1.27	1.81	1.77	1.43	1.72	1.71	1.55	1.22	1.42
50	3.6	4.2	4.2	4.0	4.1	5.9	4.6	4.8	5.9	6.3	6.8	4.1	5.0
	1.46	1.46	1.54	1.53	1.40	2.00	1.96	1.58	1.90	1.88	1.65	1.34	1.55
100	4.4	5.1	5.0	4.8	4.9	7.0	5.5	5.8	7.0	7.5	7.9	5.0	6.0
	1.60	1.60	1.69	1.67	1.53	2.19	2.15	1.73	2.08	2.07	1.80	1.47	1.69
200	5.4	6.3	6.2	5.9	6.0	8.7	6.7	7.1	8.7	9.3	9.3	6.1	7.4
	1.54	1.52	1.62	1.60	1.47	2.10	2.06	1.66	1.99	1.98	1.74	1.40	1.64
Freq	7.6	9.0	8.0	8.0	6.3	10.1	5.3	6.2	9.3	12.2	10.8	7.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	2.2	2.2	2.1	2.3	3.1	2.5	2.7	3.2	3.4	3.6	2.1	2.7
	1.22	1.24	1.30	1.24	1.25	1.68	1.61	1.41	1.61	1.59	1.45	1.13	1.35
25	2.6	3.0	2.9	2.8	3.1	4.2	3.3	3.5	4.2	4.5	4.7	2.8	3.6
	1.29	1.32	1.37	1.31	1.32	1.78	1.71	1.49	1.71	1.68	1.51	1.19	1.41
50	3.2	3.6	3.6	3.4	3.8	5.0	4.0	4.3	5.1	5.5	5.7	3.4	4.3
	1.39	1.43	1.49	1.42	1.43	1.93	1.85	1.62	1.85	1.82	1.58	1.29	1.51
100	3.9	4.5	4.3	4.1	4.6	6.1	4.8	5.3	6.2	6.7	6.8	4.2	5.3
	1.58	1.62	1.69	1.62	1.63	2.20	2.11	1.84	2.11	2.07	1.74	1.46	1.69
200	4.7	5.4	5.3	5.0	5.7	7.4	5.9	6.4	7.6	8.1	8.0	5.2	6.4
	1.52	1.56	1.63	1.56	1.57	2.12	2.03	1.77	2.03	1.99	1.73	1.41	1.66
Freq	7.8	8.9	8.0	7.7	6.9	9.4	5.4	6.6	9.7	12.0	10.4	7.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.1	213	3.6	92	3.1	61	2.5	29
25	5.6	270	4.3	141	3.9	104	3.2	62
50	6.0	323	4.9	189	4.5	147	3.9	97
100	6.5	423	5.8	285	5.4	219	4.7	146
200	7.2	602	7.2	560	6.6	420	5.7	270

Capo Bellavista

32° 56′ 00″ N	09° 43′ 00″ E	UTM 32	E 567001 m	N 3644179 m	138 m a.s.l.

Located on the east coast of Sardinia, right at the sea. The station lies 5 km east of the village of Tortoli on the small cape Capo Bellavista. The landscape west of Tortoli is mountainous with peaks higher than 1000 m. The cape overlooks open sea from north to southeast. The flat delta of the river Mirenu extends from west to north out to a distance of 5 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00											2	-1
30	0.00											-1	-3
60	0.00											-6	-3
90	0.00											-8	1
120	0.00											-5	3
150	0.03	1000	0.00									1	2
180	0.03	2000	0.00									3	-1
210	0.05	4000	0.15									-2	-5
240	0.05	4000	0.15									-11	-4
270	0.05	5000	0.15									-14	1
300	0.00	3000	0.05	6000	0.15							-6	4
330	0.00	4000	0.15									1	3

Height of anemometer: 12.0 m a.g.l. Period: 60010100-69123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.7	287	85	84	83	68	46	50	46	38	59	51	44	32	27	5.4	1.11
30	7.8	210	106	98	112	72	54	53	48	40	74	48	30	29	26	5.5	1.15
60	6.4	306	139	146	117	82	44	46	38	18	29	20	6	6	5	3.4	1.03
90	6.6	315	225	184	117	58	32	19	9	4	16	12	3	4	5	2.5	0.92
120	8.2	238	174	182	170	79	41	36	24	15	19	12	5	2	1	3.3	1.17
150	7.7	271	177	139	127	72	54	41	37	20	33	13	10	3	1	3.4	1.09
180	8.8	225	156	133	121	88	67	59	50	29	38	21	8	5	0	4.0	1.22
210	7.5	244	138	145	149	91	59	49	34	27	37	16	6	2	0	3.7	1.24
240	5.3	324	118	133	117	63	52	44	39	26	50	23	8	3	2	3.5	1.06
270	11.6	171	120	151	157	99	62	47	37	21	49	29	23	16	19	4.3	1.03
300	17.1	124	99	151	169	119	79	61	45	28	48	34	20	10	12	4.8	1.16
330	7.2	247	92	101	112	89	73	48	44	30	55	33	32	19	27	4.9	1.07
Total	100.0	228	133	140	136	87	58	48	38	25	43	27	17	11	11	4.0	1.03

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.1	5.0	4.5	3.5	2.9	2.1	2.2	2.4	2.9	3.8	4.3	5.4	3.7
3	5.1	5.1	4.9	3.5	3.0	2.3	2.3	2.4	2.9	4.0	4.3	5.3	3.8
6	5.0	5.2	4.8	3.2	2.4	1.8	1.8	2.3	2.7	3.9	4.2	5.2	3.5
9	4.6	4.9	4.8	3.4	3.1	2.7	2.7	2.6	2.7	3.6	3.5	4.7	3.6
12	4.8	5.6	5.9	4.4	3.8	3.5	3.7	3.8	4.1	4.6	4.4	5.2	4.5
15	5.4	5.7	6.2	4.6	4.0	3.2	3.7	3.8	4.4	4.6	4.7	5.2	4.6
18	4.8	5.4	5.2	4.0	3.3	2.9	3.0	3.4	3.8	3.9	4.0	5.4	4.1
21	5.3	4.9	4.7	3.4	2.7	2.4	2.3	2.7	3.0	3.6	4.1	5.6	3.7
Day	5.0	5.2	5.1	3.7	3.2	2.6	2.7	2.9	3.3	4.0	4.2	5.3	3.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	5.5	3.8	2.8	3.3	3.7	4.5	5.8	5.9	7.3	6.0	5.6	5.0
	1.10	1.14	1.01	0.93	1.13	1.09	1.20	1.40	1.19	1.08	1.24	1.20	1.06
25	5.7	6.0	4.2	3.1	3.7	4.1	4.9	6.4	6.5	7.9	6.6	6.2	5.5
	1.12	1.16	1.03	0.95	1.16	1.12	1.24	1.43	1.20	1.09	1.25	1.22	1.08
50	6.1	6.4	4.6	3.4	4.0	4.4	5.3	6.8	6.9	8.4	7.1	6.6	5.9
	1.14	1.19	1.06	0.98	1.19	1.15	1.27	1.47	1.23	1.10	1.28	1.24	1.10
100	6.5	6.9	4.9	3.6	4.3	4.8	5.7	7.3	7.4	8.9	7.5	7.0	6.3
	1.12	1.17	1.03	0.95	1.15	1.12	1.23	1.43	1.22	1.10	1.26	1.23	1.09
200	7.0	7.4	5.3	3.9	4.6	5.2	6.2	8.0	7.9	9.5	8.1	7.6	6.8
	1.09	1.13	0.98	0.90	1.10	1.06	1.17	1.37	1.19	1.09	1.23	1.19	1.07
Freq	5.3	7.2	6.9	7.2	8.3	7.4	7.7	7.2	6.3	12.4	16.3	7.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.5	2.3	1.9	2.3	2.5	3.1	4.0	4.4	5.0	4.1	3.9	3.4
	0.99	0.99	0.85	0.83	0.98	0.94	1.04	1.20	1.07	1.03	1.14	1.08	0.97
25	4.3	4.3	2.8	2.3	2.8	3.1	3.8	4.8	5.2	5.9	4.8	4.6	4.1
	1.04	1.04	0.91	0.89	1.04	1.01	1.12	1.26	1.10	1.04	1.19	1.11	1.01
50	4.9	4.9	3.5	2.8	3.3	3.8	4.5	5.6	5.8	6.6	5.6	5.3	4.8
	1.11	1.11	1.01	0.99	1.16	1.12	1.24	1.37	1.13	1.06	1.27	1.17	1.06
100	5.8	5.8	4.2	3.4	4.0	4.6	5.4	6.6	6.7	7.4	6.5	6.2	5.6
	1.19	1.18	1.07	1.04	1.24	1.19	1.32	1.46	1.21	1.10	1.36	1.26	1.13
200	6.8	6.8	5.2	4.2	4.9	5.6	6.7	7.9	7.6	8.2	7.6	7.1	6.6
	1.15	1.15	1.02	1.00	1.18	1.14	1.26	1.41	1.18	1.10	1.32	1.22	1.13
Freq	5.4	7.4	7.0	7.5	8.2	7.3	7.5	7.0	6.9	14.1	15.3	6.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.0	2.0	1.6	2.0	2.3	2.7	3.6	3.9	4.3	3.6	3.4	3.0
	1.00	0.98	0.85	0.84	0.98	0.95	1.03	1.20	1.06	1.04	1.16	1.09	0.97
25	3.8	3.7	2.5	2.1	2.5	2.9	3.4	4.4	4.7	5.2	4.4	4.2	3.7
	1.04	1.02	0.90	0.89	1.04	1.01	1.10	1.25	1.08	1.06	1.21	1.12	1.01
50	4.5	4.4	3.1	2.6	3.1	3.5	4.1	5.2	5.4	6.0	5.2	4.9	4.4
	1.10	1.08	0.98	0.98	1.13	1.12	1.20	1.34	1.11	1.08	1.28	1.18	1.06
100	5.4	5.2	3.8	3.2	3.8	4.3	5.0	6.1	6.3	6.8	6.1	5.8	5.2
	1.20	1.17	1.07	1.06	1.24	1.22	1.31	1.47	1.17	1.11	1.40	1.28	1.13
200	6.3	6.1	4.6	3.8	4.6	5.2	6.1	7.3	7.1	7.7	7.2	6.7	6.2
	1.16	1.14	1.03	1.02	1.19	1.17	1.26	1.42	1.17	1.12	1.35	1.24	1.14
Freq	5.7	7.3	7.0	7.6	8.1	7.3	7.5	6.9	7.5	14.4	14.4	6.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.3	1.5	1.4	1.6	1.8	2.2	2.8	3.2	3.3	2.9	2.7	2.4
	1.01	0.97	0.84	0.89	0.96	0.97	1.05	1.18	1.07	1.05	1.17	1.11	0.99
25	3.3	3.0	2.0	1.9	2.1	2.5	3.0	3.7	4.2	4.3	3.8	3.6	3.2
	1.05	1.00	0.88	0.94	1.01	1.02	1.10	1.23	1.09	1.06	1.21	1.14	1.01
50	4.0	3.7	2.5	2.3	2.6	3.0	3.7	4.4	4.9	5.1	4.5	4.3	3.8
	1.10	1.06	0.95	1.01	1.09	1.10	1.19	1.29	1.11	1.08	1.27	1.19	1.06
100	4.8	4.5	3.2	3.0	3.3	3.8	4.6	5.3	5.8	5.9	5.4	5.2	4.6
	1.20	1.16	1.06	1.13	1.23	1.24	1.35	1.41	1.15	1.12	1.37	1.27	1.13
200	5.7	5.3	3.8	3.6	4.0	4.6	5.5	6.4	6.7	6.8	6.4	6.1	5.5
	1.19	1.15	1.03	1.10	1.19	1.20	1.30	1.40	1.18	1.14	1.37	1.28	1.15
Freq	5.9	7.3	7.1	7.7	7.9	7.4	7.3	6.8	8.3	14.9	13.1	6.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.9	376	3.5	167	3.0	110	2.4	52
25	5.3	471	4.1	251	3.7	183	3.1	109
50	5.7	551	4.7	324	4.3	250	3.7	167
100	6.1	686	5.4	423	5.0	336	4.4	236
200	6.6	913	6.4	708	5.9	552	5.2	380

Capo Palinuro

40° 01′ 00″ N	15° 17′ 00″ E	UTM 33	E 524180 m	N 4429721 m	184 m a.s.l.

Located on Cape Palinuro in the southern part of Campania. The station is situated 1 km south of the village of Palinuro. The terrain east of the station is vegetated and mountainous. The cape is oriented west to east and the station lies on the south coast, 184 m above the sea. The south coast is rugged with very steep slopes, whereas the slopes are more gradual to the north.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	900	0.01									28	-8
30	0.05	1000	0.15									24	3
60	0.05	1000	0.15									44	10
90	0.05	700	0.00									55	6
120	0.05	400	0.00									58	-2
150	0.05	300	0.00									43	-8
180	0.00											21	-6
210	0.00											16	3
240	0.01	600	0.00									34	9
270	0.05	1200	0.00									59	6
300	0.05	1500	0.00									66	-2
330	0.05	800	0.00									46	-8

Height of anemometer: 24.0 m a.g.l. Period: 60010100-69123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	14.8	152	157	203	186	100	54	51	33	15	25	15	4	4	1	3.7	1.26
30	12.6	187	197	243	166	66	41	33	28	9	16	9	2	2	1	3.1	1.18
60	7.5	298	179	183	136	64	38	35	26	15	16	5	2	0	0	2.9	1.19
90	4.2	483	126	121	106	57	34	30	18	7	10	8	2	0	0	2.2	0.99
120	7.8	273	125	157	141	81	57	42	35	19	35	23	7	3	1	3.6	1.14
150	12.6	167	111	163	169	105	72	52	49	27	43	24	10	6	1	4.2	1.24
180	12.0	200	174	232	167	74	51	33	19	9	20	10	6	4	3	3.2	1.10
210	5.8	370	176	173	109	48	32	19	21	9	22	8	9	1	3	2.5	0.94
240	3.4	566	115	98	59	39	29	30	24	7	13	8	8	3	0	1.7	0.78
270	3.6	560	86	95	59	34	42	29	45	21	18	11	0	3	0	2.0	0.84
300	4.7	430	107	113	128	59	42	36	25	16	28	10	4	1	1	2.8	1.03
330	11.1	191	99	155	164	91	70	61	54	30	43	24	9	5	4	4.2	1.22
Total	100.0	257	145	179	150	77	51	41	33	16	26	14	6	3	2	3.4	1.14

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.5	3.5	3.0	2.1	2.0	1.7	1.8	2.0	2.1	2.7	3.9	4.5	2.7
3	3.7	3.5	3.1	2.7	2.2	1.9	1.7	2.0	2.1	2.8	4.0	4.5	2.9
6	3.6	3.9	3.2	2.3	2.1	1.6	1.4	1.7	2.1	3.0	3.9	4.3	2.7
9	3.3	3.4	3.1	2.9	2.7	2.5	2.4	2.4	2.6	2.9	4.0	4.3	3.1
12	3.8	4.1	3.8	3.3	2.9	2.8	2.9	2.9	3.1	3.4	4.5	4.3	3.5
15	4.2	4.1	3.8	3.4	3.1	3.0	3.4	3.7	3.2	3.1	4.3	4.6	3.7
18	3.8	4.1	3.9	3.0	2.9	2.8	3.3	3.4	3.1	2.8	3.8	4.0	3.4
21	3.6	3.6	2.7	2.0	2.0	2.0	2.0	2.1	2.0	2.7	3.9	4.4	2.7
Day	3.7	3.8	3.3	2.7	2.5	2.3	2.4	2.5	2.5	2.9	4.0	4.4	3.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.4	2.8	1.6	2.0	2.7	2.6	2.1	1.4	1.3	1.7	2.8	2.7
	1.36	1.31	1.31	0.99	1.10	1.25	1.12	0.96	0.81	0.84	0.99	1.22	1.15
25	3.8	3.7	3.1	1.8	2.3	3.0	2.9	2.3	1.5	1.5	1.9	3.1	2.9
	1.40	1.35	1.35	1.01	1.13	1.28	1.15	0.99	0.83	0.86	1.01	1.25	1.18
50	4.1	4.0	3.4	1.9	2.4	3.3	3.1	2.5	1.7	1.6	2.0	3.3	3.2
	1.44	1.38	1.38	1.04	1.16	1.32	1.18	1.01	0.85	0.88	1.04	1.28	1.21
100	4.4	4.3	3.6	2.0	2.6	3.5	3.4	2.7	1.8	1.7	2.2	3.6	3.4
	1.40	1.34	1.34	1.01	1.12	1.27	1.15	0.98	0.83	0.86	1.01	1.24	1.17
200	4.9	4.8	4.0	2.2	2.8	3.8	3.7	2.9	1.9	1.8	2.4	3.9	3.7
	1.32	1.27	1.27	0.96	1.07	1.21	1.09	0.94	0.79	0.82	0.96	1.18	1.12
Freq	15.8	15.3	7.9	3.9	5.8	10.4	13.9	7.8	4.0	3.1	3.5	8.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.3	1.7	1.1	1.5	1.7	1.7	1.3	0.8	0.9	1.4	1.9	1.8
	1.18	1.14	1.06	0.89	0.99	0.99	0.92	0.80	0.70	0.77	0.92	1.02	0.99
25	2.9	2.9	2.1	1.4	1.9	2.1	2.1	1.6	1.0	1.2	1.7	2.4	2.2
	1.27	1.23	1.14	0.95	1.06	1.07	0.99	0.85	0.74	0.83	0.98	1.09	1.06
50	3.5	3.4	2.5	1.7	2.3	2.6	2.5	1.9	1.3	1.5	2.1	2.8	2.6
	1.42	1.37	1.27	1.06	1.18	1.19	1.10	0.94	0.82	0.91	1.09	1.22	1.17
100	4.2	4.1	3.0	2.0	2.7	3.1	3.0	2.4	1.6	1.8	2.5	3.4	3.2
	1.51	1.46	1.36	1.12	1.25	1.26	1.17	0.99	0.86	0.96	1.15	1.29	1.24
200	5.2	5.0	3.7	2.5	3.3	3.8	3.7	2.9	1.9	2.2	3.1	4.2	3.9
	1.44	1.40	1.30	1.08	1.20	1.21	1.12	0.95	0.83	0.92	1.10	1.24	1.19
Freq	16.2	14.0	6.4	4.0	6.9	11.4	13.1	6.5	3.5	3.1	4.6	10.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	2.0	1.5	1.0	1.4	1.6	1.5	1.1	0.7	0.9	1.3	1.7	1.6
	1.14	1.10	1.08	0.92	1.04	1.03	0.94	0.80	0.70	0.79	0.96	1.02	0.99
25	2.6	2.5	1.9	1.3	1.8	2.0	1.9	1.4	0.9	1.1	1.7	2.2	2.0
	1.22	1.17	1.15	0.98	1.10	1.10	1.00	0.85	0.74	0.84	1.02	1.09	1.05
50	3.1	3.0	2.3	1.6	2.2	2.4	2.3	1.8	1.2	1.4	2.1	2.6	2.4
	1.34	1.29	1.26	1.07	1.21	1.21	1.10	0.92	0.81	0.91	1.12	1.20	1.15
100	3.7	3.6	2.8	2.0	2.7	2.9	2.8	2.2	1.5	1.7	2.5	3.2	2.9
	1.47	1.41	1.38	1.17	1.33	1.31	1.20	1.00	0.88	0.99	1.23	1.31	1.25
200	4.6	4.4	3.4	2.4	3.2	3.6	3.4	2.7	1.8	2.1	3.1	3.9	3.6
	1.41	1.35	1.33	1.12	1.27	1.26	1.15	0.97	0.85	0.95	1.18	1.26	1.21
Freq	16.1	13.2	6.1	4.3	7.4	11.8	12.3	6.2	3.4	3.2	5.1	10.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.7	1.6	1.2	0.8	1.2	1.3	1.2	0.9	0.6	0.7	1.2	1.5	1.3
	1.19	1.16	1.07	0.90	1.07	1.08	0.98	0.79	0.74	0.81	1.02	1.09	1.03
25	2.2	2.2	1.6	1.1	1.6	1.8	1.7	1.2	0.9	1.0	1.6	2.0	1.7
	1.26	1.23	1.13	0.95	1.13	1.14	1.03	0.83	0.77	0.85	1.08	1.15	1.08
50	2.8	2.7	1.9	1.4	2.0	2.2	2.1	1.5	1.1	1.2	1.9	2.4	2.1
	1.36	1.33	1.23	1.02	1.23	1.24	1.12	0.88	0.83	0.91	1.16	1.24	1.17
100	3.4	3.3	2.4	1.7	2.5	2.7	2.6	1.9	1.4	1.5	2.4	3.0	2.7
	1.54	1.50	1.38	1.15	1.38	1.40	1.26	0.99	0.93	1.02	1.31	1.41	1.31
200	4.1	4.0	2.9	2.1	3.0	3.3	3.1	2.3	1.7	1.9	2.9	3.7	3.2
	1.49	1.45	1.34	1.11	1.34	1.35	1.22	0.96	0.90	0.99	1.27	1.36	1.27
Freq	15.9	12.1	5.6	4.7	8.1	12.3	11.3	5.6	3.3	3.3	5.9	12.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	2.5	43	1.8	21	1.6	14	1.3	7
25	2.8	53	2.1	31	1.9	23	1.7	14
50	3.0	64	2.5	39	2.3	31	2.0	21
100	3.2	86	3.0	59	2.7	45	2.5	30
200	3.6	129	3.7	124	3.4	91	3.0	59

Capo Sandalo

39° 09′ 00″ N	08° 14′ 00″ E	UTM 32	E 433750 m	N 4333775 m	100 m a.s.l.

Location at western extremity of S. Pietro island in the SW of Sardinia. The station is located on a rocky headland, about 100 m above the sea. Mountain ridges, 150-200 m high, occur in the sectors NE-SE. The ground around the station is covered with 40-50 cm low Mediterranean vegetation.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00											23	-5
30	0.05	2500	0.00									23	
60	0.15											35	7
90	0.05											48	6
120	0.05	1000	0.03	3000	0.10							56	1
150	0.00											35	-5
180	0.00											23	-5
210	0.00											17	
240	0.00											24	5
270	0.00											37	4
300	0.00											42	
330	0.00											35	-5

Height of anemometer: 15.0 m a.g.l. Period: 81021712-86012603

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	16.9	19	32	75	94	125	111	115	96	67	113	60	33	34	28	7.8	1.57
30	8.2	33	78	106	101	80	72	61	59	50	74	46	23	42	174	8.8	1.13
60	5.0	57	87	116	148	114	87	68	62	19	13	14	12	39	162	5.9	0.90
90	4.6	56	71	102	89	151	100	112	99	65	63	37	28	9	20	6.7	1.56
120	9.0	29	46	49	75	80	70	78	83	62	124	105	109	51	40	9.6	1.99
150	10.0	15	55	89	93	97	117	100	85	89	120	65	21	23	33	7.8	1.64
180	6.7	41	78	101	101	104	139	81	76	48	96	47	33	29	23	6.8	1.44
210	3.0	43	109	218	186	130	85	60	53	30	45	21	11	10	0	4.6	1.33
240	2.7	95	135	167	135	121	86	91	57	40	43	14	12	4	0	4.8	1.53
270	4.6	69	153	161	135	85	106	72	75	39	55	36	13	2	0	5.2	1.52
300	8.2	45	68	114	98	88	79	67	69	71	90	93	43	28	47	8.0	1.51
330	21.3	21	39	60	80	82	81	85	80	68	114	85	70	42	93	9.6	1.58
Total	100.0	33	62	93	99	100	94	87	79	61	95	64	43	32	60	7.9	1.38

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	11.7	7.1	7.2	6.2	5.3	6.0	5.2	5.9	6.1	6.9	9.2	11.1	7.3
3	11.7	7.1	7.2	6.0	5.8	6.6	5.8	5.8	6.3	6.8	9.4	11.5	7.5
6	11.8	6.6	7.2	6.2	5.8	6.0	5.4	5.8	6.2	6.8	9.2	11.3	7.4
9	11.5	6.3	7.0	6.6	5.8	5.9	5.1	5.7	5.9	6.1	8.9	9.7	7.1
12	11.3	6.4	7.0	7.2	6.2	6.4	5.8	6.0	6.2	6.3	9.2	10.0	7.4
15	11.5	6.8	7.5	7.1	6.2	6.5	5.9	6.5	6.5	6.7	9.7	10.5	7.7
18	11.1	6.6	7.3	7.0	5.4	6.3	5.9	6.8	6.3	6.8	9.5	10.6	7.5
21	11.4	6.9	7.3	6.3	5.3	6.0	5.6	6.6	6.2	6.3	9.3	11.0	7.4
Day	11.5	6.7	7.2	6.6	5.7	6.2	5.6	6.1	6.2	6.6	9.3	10.7	7.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.3	7.6	7.0	6.9	8.6	5.8	5.5	4.2	3.8	3.8	5.3	6.8	6.2
	1.51	1.11	0.98	1.51	2.22	1.63	1.48	1.32	1.48	1.41	1.48	1.56	1.26
25	6.9	8.3	7.6	7.5	9.4	6.3	6.1	4.7	4.2	4.2	5.9	7.4	6.8
	1.56	1.12	0.98	1.54	2.28	1.68	1.52	1.36	1.53	1.45	1.52	1.61	1.28
50	7.4	8.8	8.1	8.1	10.0	6.8	6.5	5.0	4.5	4.6	6.3	8.0	7.3
	1.60	1.12	0.99	1.58	2.35	1.72	1.56	1.40	1.57	1.49	1.56	1.65	1.31
100	8.1	9.3	8.6	8.6	10.8	7.4	7.1	5.4	4.9	4.9	6.8	8.6	7.9
	1.55	1.13	0.99	1.55	2.28	1.67	1.52	1.35	1.52	1.44	1.52	1.60	1.30
200	8.9	9.9	9.1	9.3	11.9	8.1	7.7	5.9	5.4	5.4	7.5	9.4	8.6
	1.47	1.12	0.99	1.49	2.18	1.58	1.44	1.28	1.44	1.37	1.44	1.52	1.29
Freq	18.9	10.7	5.8	4.7	7.2	8.9	7.8	4.1	3.2	4.3	6.8	17.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	5.7	4.9	5.0	5.6	3.9	3.7	2.7	2.6	2.8	4.0	4.6	4.3
	1.23	1.06	0.94	1.57	1.77	1.38	1.25	1.13	1.26	1.17	1.27	1.33	1.14
25	5.3	6.7	5.7	6.0	6.7	4.7	4.5	3.3	3.1	3.4	4.8	5.5	5.1
	1.30	1.08	0.95	1.69	1.90	1.48	1.35	1.22	1.35	1.25	1.36	1.43	1.19
50	6.2	7.4	6.4	6.9	7.7	5.5	5.3	3.9	3.7	4.1	5.6	6.5	6.0
	1.42	1.10	0.97	1.88	2.11	1.66	1.51	1.36	1.51	1.40	1.52	1.59	1.28
100	7.3	8.3	7.1	8.2	9.1	6.5	6.3	4.7	4.4	4.8	6.7	7.7	7.1
	1.52	1.13	0.99	2.01	2.25	1.77	1.60	1.44	1.61	1.49	1.62	1.69	1.37
200	8.8	9.3	7.9	10.2	11.2	8.1	7.8	5.8	5.5	6.0	8.3	9.5	8.6
	1.46	1.13	0.99	1.92	2.15	1.69	1.53	1.38	1.54	1.42	1.55	1.62	1.40
Freq	17.3	9.2	5.3	5.1	7.8	8.8	7.1	3.7	3.4	4.8	8.9	18.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	5.0	4.2	4.4	4.7	3.4	3.2	2.4	2.3	2.6	3.5	3.9	3.7
	1.18	1.06	0.95	1.59	1.74	1.37	1.24	1.18	1.25	1.18	1.27	1.31	1.14
25	4.8	6.0	5.1	5.5	5.9	4.2	4.0	3.0	2.8	3.2	4.4	4.9	4.6
	1.23	1.08	0.96	1.70	1.86	1.46	1.32	1.25	1.33	1.25	1.36	1.39	1.19
50	5.6	6.8	5.8	6.4	6.9	5.0	4.8	3.6	3.4	3.8	5.3	5.8	5.4
	1.31	1.09	0.98	1.87	2.05	1.61	1.46	1.38	1.47	1.38	1.50	1.52	1.26
100	6.6	7.8	6.6	7.7	8.2	6.0	5.7	4.4	4.1	4.6	6.3	6.9	6.5
	1.44	1.12	0.99	2.05	2.25	1.77	1.60	1.51	1.61	1.51	1.64	1.67	1.36
200	7.8	8.7	7.4	9.4	10.0	7.3	7.0	5.3	5.0	5.7	7.8	8.5	7.8
	1.39	1.14	1.01	1.96	2.16	1.69	1.52	1.45	1.54	1.45	1.57	1.60	1.38
Freq	16.5	8.8	5.3	5.3	8.0	8.6	6.7	3.6	3.5	5.1	9.9	18.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.9	3.4	3.6	3.6	2.7	2.5	1.8	1.8	2.1	2.8	3.1	3.0
	1.18	1.06	0.99	1.67	1.69	1.38	1.26	1.15	1.24	1.18	1.27	1.31	1.15
25	4.2	5.1	4.3	4.8	4.7	3.5	3.3	2.5	2.4	2.8	3.8	4.1	3.9
	1.21	1.07	0.99	1.77	1.79	1.46	1.33	1.21	1.31	1.25	1.35	1.39	1.19
50	5.0	5.9	5.1	5.8	5.7	4.3	4.1	3.0	2.9	3.5	4.6	5.0	4.7
	1.27	1.08	1.01	1.91	1.95	1.58	1.45	1.31	1.42	1.35	1.46	1.50	1.26
100	6.0	6.9	5.9	6.9	6.9	5.3	5.0	3.7	3.6	4.2	5.7	6.1	5.7
	1.37	1.11	1.02	2.17	2.22	1.80	1.64	1.48	1.62	1.53	1.66	1.70	1.36
200	7.1	7.9	6.8	8.4	8.4	6.4	6.1	4.5	4.4	5.2	6.9	7.4	6.9
	1.37	1.14	1.05	2.10	2.14	1.74	1.58	1.43	1.56	1.48	1.60	1.64	1.40
Freq	15.3	8.3	5.2	5.6	8.2	8.5	6.2	3.5	3.7	5.4	11.4	18.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.8	427	4.1	184	3.6	122	2.8	58
25	6.3	541	4.8	281	4.4	206	3.7	122
50	6.7	639	5.5	369	5.1	287	4.4	190
100	7.3	805	6.5	519	5.9	405	5.2	280
200	8.0	1079	7.8	897	7.1	688	6.3	465

Cirras

39° 49′ 00″ N 08° 34′ 00″ E	UTM 32 E 462910 m N 4407574 m	5 m a.s.l.

Location in the SW part of Sardinia close to the SW coast at the Gulf of Oristano and 3 km south of the structures of the harbour. Around the mast the terrain is open and flat, but the mast is in the vicinity of a local depot where sand is stored in mounds which can reach a height of 10 m but are flattened when the sand is used. In this area there are also buildings for machines and workers. One km to the W there is a row of low summer houses along the coast.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10	1000	0.07	2000	0.05							1	1
30	0.03	1000	0.00									1	
60	0.03	600	0.00	3000	0.03							-1	-2
90	0.02	600	0.01	1200	0.05							-3	-1
120	0.03											-4	1
150	0.03											-1	2
180	0.05											1	1
210	0.10	2000	0.00									2	
240	0.10	1500	0.00										-1
270	0.10	1500	0.00									-3	-1
300	0.20	1600	0.00									-3	
330	0.10											-1	2

Height of anemometer: 30.0 m a.g.l. Period: 80062112-85100512

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.4	94	72	76	114	101	81	72	86	65	83	59	35	16	45	7.3	1.36
30	5.1	146	171	117	115	90	77	77	45	44	49	29	12	9	20	4.9	1.14
60	10.3	115	167	166	174	99	82	49	50	24	43	17	6	8	1	4.1	1.24
90	8.5	173	262	228	123	62	33	40	23	14	24	8	7	2	1	2.8	1.02
120	6.9	170	255	201	95	72	38	37	23	31	41	21	8	5	3	3.1	0.98
150	8.6	85	148	117	105	80	70	65	82	60	106	51	27	5	1	6.1	1.59
180	5.5	95	115	141	163	105	112	64	49	41	48	21	20	10	16	5.2	1.25
210	3.7	69	115	102	106	135	99	111	84	67	59	31	16	4	3	5.9	1.76
240	5.3	102	97	151	129	98	82	68	60	57	63	47	29	15	2	5.6	1.40
270	10.1	79	117	130	138	152	116	88	50	29	54	26	13	5	3	5.2	1.51
300	13.9	56	75	94	105	127	137	100	73	51	77	41	27	21	16	6.4	1.47
330	14.6	38	47	78	90	88	104	106	95	81	107	64	49	26	26	7.9	1.72
Total	100.0	94	129	129	120	101	90	75	62	48	67	37	23	12	12	5.6	1.34

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.0	5.9	4.8	3.9	4.0	3.3	2.7	3.0	3.4	4.8	4.6	6.6	4.3
3	5.9	5.3	5.0	4.2	3.7	3.4	2.9	3.0	3.0	4.4	4.4	6.2	4.2
6	6.0	5.7	4.6	4.4	4.5	3.1	3.0	3.2	3.1	4.6	4.9	6.2	4.3
9	5.9	5.5	4.4	4.7	5.3	4.6	4.1	4.0	3.5	4.8	4.5	5.8	4.7
12	7.3	6.3	6.1	6.4	6.6	6.7	6.1	6.3	5.9	6.2	4.9	7.0	6.3
15	7.5	7.5	6.9	6.5	6.3	6.6	6.3	6.6	6.2	6.6	5.2	7.1	6.6
18	6.7	6.4	5.8	5.5	5.1	5.4	5.1	5.5	4.8	5.5	4.8	6.1	5.5
21	6.3	6.5	4.8	4.3	4.2	3.9	3.4	3.7	3.5	5.0	4.6	6.8	4.7
Day	6.5	6.2	5.3	5.0	5.0	4.6	4.2	4.4	4.2	5.2	4.7	6.5	5.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.3	5.2	4.3	3.8	3.9	6.7	6.4	6.1	5.8	5.5	7.0	9.9	6.4
	1.51	1.09	1.30	1.18	1.06	1.57	1.39	1.52	1.39	1.43	1.44	1.73	1.29
25	10.1	5.7	4.7	4.2	4.3	7.3	7.0	6.7	6.4	6.0	7.7	10.8	7.0
	1.53	1.11	1.34	1.22	1.09	1.61	1.42	1.57	1.44	1.47	1.47	1.75	1.31
50	10.8	6.2	5.1	4.5	4.6	7.9	7.5	7.2	6.9	6.5	8.2	11.5	7.5
	1.55	1.14	1.38	1.24	1.12	1.65	1.46	1.61	1.47	1.51	1.51	1.78	1.34
100	11.5	6.6	5.5	4.9	4.9	8.5	8.0	7.8	7.4	7.0	8.8	12.2	8.0
	1.55	1.12	1.33	1.21	1.09	1.61	1.42	1.56	1.43	1.46	1.48	1.77	1.33
200	12.3	7.1	6.0	5.3	5.4	9.3	8.7	8.5	8.1	7.7	9.6	13.1	8.7
	1.52	1.08	1.27	1.15	1.04	1.54	1.37	1.48	1.35	1.39	1.43	1.73	1.30
Freq	8.3	5.3	9.1	9.0	7.6	8.4	5.8	3.9	4.9	9.4	13.8	14.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	2.8	2.8	2.5	2.8	4.9	4.3	4.1	3.7	3.8	5.1	7.4	4.4
	1.29	0.94	1.10	0.98	0.95	1.44	1.19	1.37	1.14	1.20	1.28	1.65	1.16
25	7.2	3.5	3.4	3.0	3.5	5.9	5.2	5.0	4.6	4.6	6.0	8.6	5.2
	1.32	1.00	1.18	1.05	1.01	1.53	1.25	1.47	1.23	1.29	1.34	1.69	1.21
50	8.1	4.2	4.1	3.6	4.1	6.8	5.9	5.8	5.4	5.4	6.9	9.7	6.0
	1.36	1.12	1.31	1.17	1.12	1.69	1.35	1.65	1.37	1.44	1.43	1.75	1.29
100	9.1	5.1	4.9	4.4	4.9	8.0	6.9	7.0	6.5	6.5	8.0	10.9	7.1
	1.44	1.18	1.40	1.24	1.19	1.81	1.44	1.76	1.46	1.53	1.53	1.87	1.38
200	10.2	6.3	6.0	5.4	6.0	9.8	8.2	8.6	8.0	8.0	9.4	12.4	8.4
	1.42	1.13	1.33	1.19	1.14	1.73	1.39	1.68	1.39	1.46	1.48	1.83	1.38
Freq	7.1	5.3	9.8	8.8	7.4	8.3	5.2	3.7	5.6	10.5	14.4	14.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	2.5	2.5	2.2	2.6	4.3	3.8	3.6	3.3	3.4	4.6	6.4	3.8
	1.27	0.95	1.15	0.98	0.99	1.42	1.22	1.36	1.16	1.21	1.31	1.64	1.17
25	6.3	3.1	3.2	2.8	3.3	5.3	4.7	4.5	4.1	4.3	5.7	7.8	4.7
	1.29	1.01	1.22	1.04	1.05	1.50	1.27	1.46	1.24	1.29	1.36	1.67	1.22
50	7.2	3.8	3.8	3.3	4.0	6.2	5.5	5.3	4.9	5.1	6.6	8.9	5.5
	1.33	1.11	1.35	1.15	1.14	1.63	1.36	1.61	1.37	1.42	1.44	1.73	1.29
100	8.2	4.7	4.6	4.1	4.8	7.3	6.5	6.4	5.9	6.2	7.7	10.1	6.6
	1.40	1.21	1.48	1.25	1.24	1.79	1.49	1.76	1.49	1.56	1.57	1.84	1.39
200	9.3	5.7	5.7	5.0	5.8	8.8	7.7	7.8	7.3	7.6	9.0	11.5	7.8
	1.40	1.16	1.41	1.20	1.20	1.72	1.44	1.69	1.43	1.50	1.52	1.83	1.39
Freq	6.9	5.8	9.7	8.6	7.4	8.0	5.0	3.9	6.1	10.9	14.3	13.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	1.9	1.9	1.7	2.3	3.3	3.0	2.8	2.6	2.8	3.8	5.0	3.0
	1.24	0.95	1.07	0.96	1.07	1.41	1.26	1.31	1.18	1.20	1.34	1.63	1.17
25	5.0	2.5	2.5	2.3	3.1	4.4	4.0	3.7	3.4	3.7	4.9	6.5	3.9
	1.26	1.00	1.13	1.01	1.12	1.48	1.31	1.38	1.25	1.27	1.38	1.66	1.21
50	5.9	3.1	3.1	2.8	3.8	5.3	4.8	4.5	4.2	4.6	5.9	7.7	4.8
	1.29	1.08	1.23	1.09	1.20	1.58	1.39	1.50	1.35	1.37	1.44	1.71	1.27
100	6.9	3.9	3.8	3.5	4.7	6.4	5.8	5.5	5.2	5.6	7.0	8.9	5.8
	1.34	1.21	1.38	1.23	1.35	1.77	1.54	1.71	1.53	1.56	1.54	1.79	1.37
200	8.1	4.8	4.6	4.3	5.6	7.7	7.0	6.7	6.3	6.8	8.3	10.3	6.9
	1.37	1.17	1.34	1.19	1.31	1.73	1.52	1.64	1.48	1.50	1.55	1.83	1.39
Freq	6.7	6.6	9.6	8.4	7.5	7.6	4.8	4.1	6.8	11.4	14.2	12.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.9	431	4.1	186	3.6	122	2.8	59
25	6.4	543	4.9	283	4.4	207	3.7	122
50	6.9	640	5.6	370	5.1	287	4.4	191
100	7.4	808	6.5	508	6.0	400	5.3	278
200	8.0	1080	7.7	874	7.1	678	6.3	463

Fiume Santo

40° 51′ 00″ N 08° 18′ 00″ E	UTM 32 E 440992 m N 4522420 m	50 m a.s.l.

Location 4 km from the NW coast of Sardinia and 10 km W of the town of Portotorres. The countryside is generally flat with low vegetation, but with a hilly region 2–3 km away in the sectors SE–SW. The hills are up to 300 m high. The anemometer is situated at the wind power plant of ENEL, the Italian utility company.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	3000	0.00										
30	0.05	2000	0.00										
60	0.05	2500	0.00										
90	0.05	5000	0.01										
120	0.05												
150	0.05												
180	0.05												
210	0.05	17000	0.00										
240	0.05	12000	0.00										
270	0.05	8000	0.00										
300	0.05	7000	0.00										
330	0.05	5000	0.01										

Height of anemometer: 15.0 m a.g.l. Period: 81112615–85071106

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	1.5	336	117	89	160	135	58	24	6	36	7	15	8	7	0	3.6	1.26
30	6.4	50	79	177	271	200	99	49	17	6	20	16	12	3	0	4.4	1.50
60	11.1	35	43	146	157	160	90	67	71	62	84	51	29	2	2	6.0	1.58
90	7.3	73	117	123	132	93	105	76	61	70	82	35	33	3	0	5.9	1.61
120	4.4	149	220	245	142	114	72	25	5	11	14	3	0	0	0	3.1	1.46
150	5.3	118	274	302	153	74	21	24	15	13	5	0	0	0	0	2.9	1.49
180	8.9	60	153	314	249	69	48	34	21	26	19	4	1	0	0	3.5	1.42
210	14.2	41	107	151	195	178	98	57	57	39	53	14	8	1	0	4.9	1.60
240	10.2	87	148	147	124	125	103	86	55	42	51	21	8	2	0	5.0	1.60
270	14.7	42	61	81	89	131	143	129	98	80	83	42	15	8	0	6.7	2.09
300	12.8	25	73	70	92	106	115	83	83	61	119	69	47	31	26	7.8	1.68
330	3.1	75	97	162	92	103	78	78	67	40	85	53	36	23	11	6.3	1.43
Total	100.0	62	110	155	151	128	96	71	57	47	62	31	18	7	4	5.3	1.42

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.7	5.1	5.2	4.2	3.5	3.1	2.4	2.6	3.6	3.9	4.9	6.5	4.2
3	5.7	5.2	5.5	4.9	3.9	3.5	2.5	2.9	3.7	3.7	5.1	6.1	4.4
6	5.9	5.5	5.4	4.8	3.9	3.6	2.8	2.9	3.9	3.9	5.0	6.1	4.5
9	6.3	5.7	6.0	4.8	4.9	4.9	3.7	4.3	5.2	4.6	5.5	6.8	5.3
12	7.0	6.1	6.6	5.0	6.0	5.7	4.9	5.8	6.0	5.6	6.4	7.4	6.1
15	6.4	6.0	6.5	4.7	6.0	5.6	4.9	6.2	6.2	5.6	6.3	6.6	6.0
18	5.6	5.5	5.6	4.3	4.9	4.4	3.4	4.3	4.6	4.3	5.3	6.1	4.9
21	5.4	5.4	4.9	3.9	3.4	2.9	2.3	2.8	3.8	3.7	4.8	6.3	4.1
Day	6.0	5.5	5.7	4.6	4.6	4.2	3.4	4.0	4.6	4.4	5.4	6.5	4.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	5.2	6.7	7.8	5.2	4.1	4.8	6.3	6.3	8.2	9.4	9.0	6.8
	1.12	1.51	1.49	1.79	1.51	1.73	1.63	1.64	1.56	1.99	1.65	1.65	1.50
25	5.4	5.7	7.4	8.6	5.7	4.5	5.3	6.9	6.9	8.9	10.2	9.9	7.5
	1.15	1.56	1.53	1.83	1.56	1.78	1.68	1.70	1.61	2.05	1.67	1.67	1.53
50	5.8	6.1	7.9	9.2	6.1	4.8	5.7	7.4	7.4	9.6	10.9	10.5	8.0
	1.18	1.60	1.58	1.88	1.60	1.82	1.73	1.74	1.65	2.10	1.70	1.71	1.57
100	6.3	6.6	8.5	9.9	6.6	5.2	6.1	8.0	8.1	10.4	11.6	11.2	8.6
	1.15	1.55	1.53	1.84	1.54	1.77	1.67	1.69	1.60	2.05	1.69	1.69	1.55
200	6.8	7.2	9.3	10.8	7.3	5.8	6.7	8.8	8.8	11.4	12.5	12.0	9.4
	1.11	1.47	1.47	1.77	1.47	1.67	1.58	1.60	1.52	1.95	1.65	1.65	1.51
Freq	1.8	5.6	10.4	7.9	4.8	5.1	8.3	13.4	10.9	14.0	13.2	4.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.6	4.8	5.5	3.0	2.9	3.5	4.5	4.5	5.9	6.9	5.8	4.7
	1.15	1.23	1.34	1.54	1.42	1.45	1.38	1.44	1.35	1.72	1.51	1.38	1.33
25	3.8	4.3	5.8	6.5	3.7	3.5	4.2	5.4	5.4	7.0	8.1	6.8	5.7
	1.23	1.31	1.42	1.62	1.53	1.56	1.49	1.55	1.46	1.83	1.56	1.43	1.40
50	4.5	5.1	6.7	7.4	4.3	4.0	4.9	6.3	6.3	8.1	9.1	7.7	6.6
	1.38	1.48	1.56	1.76	1.72	1.75	1.67	1.74	1.63	2.00	1.62	1.49	1.52
100	5.4	6.1	7.9	8.6	5.1	4.8	5.9	7.5	7.5	9.4	10.3	8.8	7.7
	1.46	1.56	1.67	1.89	1.83	1.87	1.77	1.85	1.74	2.15	1.73	1.60	1.63
200	6.7	7.6	9.6	10.3	6.3	6.0	7.3	9.3	9.4	11.4	11.7	10.1	9.3
	1.40	1.50	1.60	1.82	1.75	1.78	1.70	1.76	1.66	2.06	1.69	1.56	1.62
Freq	1.9	6.8	10.8	7.1	4.5	5.6	9.3	13.9	10.5	14.6	12.1	3.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.2	4.3	4.6	2.7	2.6	3.1	3.9	4.0	5.2	6.0	4.9	4.1
	1.19	1.21	1.35	1.51	1.49	1.49	1.38	1.42	1.40	1.67	1.52	1.37	1.34
25	3.5	4.0	5.3	5.7	3.4	3.3	3.9	4.8	5.0	6.4	7.3	6.0	5.1
	1.27	1.29	1.43	1.58	1.59	1.59	1.48	1.52	1.49	1.76	1.56	1.40	1.40
50	4.2	4.8	6.2	6.6	4.0	3.9	4.7	5.7	5.9	7.4	8.3	6.9	6.0
	1.40	1.42	1.54	1.69	1.76	1.76	1.63	1.68	1.65	1.89	1.62	1.46	1.50
100	5.1	5.8	7.3	7.8	4.8	4.7	5.6	6.8	7.1	8.7	9.6	8.0	7.1
	1.53	1.55	1.70	1.86	1.93	1.93	1.79	1.85	1.81	2.07	1.72	1.58	1.64
200	6.2	7.1	8.8	9.3	5.8	5.7	6.9	8.4	8.8	10.4	10.9	9.2	8.5
	1.47	1.49	1.63	1.79	1.85	1.85	1.71	1.77	1.73	2.00	1.71	1.54	1.62
Freq	2.3	7.2	10.4	6.9	4.6	5.9	9.8	13.6	10.9	14.4	11.3	2.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.6	3.4	3.5	2.0	2.0	2.7	3.0	3.3	4.2	4.7	3.7	3.2
	1.29	1.17	1.38	1.45	1.40	1.39	1.48	1.43	1.48	1.64	1.52	1.32	1.34
25	3.1	3.4	4.5	4.5	2.7	2.7	3.6	4.0	4.4	5.4	6.1	4.8	4.3
	1.37	1.24	1.44	1.51	1.48	1.48	1.57	1.51	1.56	1.70	1.56	1.36	1.40
50	3.8	4.2	5.4	5.5	3.3	3.3	4.3	4.9	5.4	6.5	7.3	5.8	5.2
	1.48	1.34	1.54	1.60	1.61	1.60	1.71	1.64	1.69	1.79	1.60	1.40	1.48
100	4.7	5.2	6.5	6.6	4.0	4.0	5.3	6.0	6.6	7.7	8.5	6.8	6.2
	1.68	1.52	1.73	1.78	1.83	1.81	1.94	1.87	1.93	1.97	1.69	1.49	1.63
200	5.7	6.3	7.8	7.8	4.8	4.9	6.4	7.3	8.0	9.2	9.9	8.0	7.5
	1.62	1.46	1.68	1.75	1.76	1.75	1.87	1.79	1.86	1.96	1.72	1.51	1.63
Freq	3.0	7.7	10.0	6.5	4.7	6.4	10.4	13.1	11.4	14.1	10.1	2.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.2	388	4.3	164	3.8	108	3.0	52
25	6.7	491	5.2	252	4.6	185	3.9	109
50	7.2	584	5.9	335	5.4	260	4.7	172
100	7.8	745	6.9	482	6.3	374	5.6	256
200	8.5	1017	8.3	871	7.6	667	6.7	445

Gioia del Colle

40° 41′ 00″ N 16° 56′ 00″ E	UTM 33 E 663384 m N 4505480 m	350 m a.s.l.

Location on the Murge plateau, 3 km SE of the town of Gioia del Colle, in the Puglia region. The distance to the Apennine Mountains is about 40 km and the Adriatic and Ionian Seas are both approx. 35 km away. The natural vegetation consists of grass and bushes, the cultivated areas are used to grow olives and almonds (trees of up to 3 m height).

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.20										
30	0.03	1000	0.20										
60	0.03	1000	0.20										
90	0.03	1000	0.20										
120	0.03	1000	0.20										
150	0.03	1000	0.20										
180	0.03	1000	0.20										
210	0.03	1000	0.20										
240	0.03	1000	0.20										
270	0.03	1000	0.20										
300	0.03	1000	0.20										
330	0.03	1000	0.20										

Height of anemometer: 6.0 m a.g.l. Period: 65010103–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	15.4	168	55	123	176	154	99	85	62	31	32	11	3	0	0	4.8	1.76
30	11.9	219	109	199	219	135	55	33	15	8	5	3	0	0	0	3.5	1.81
60	3.9	647	67	96	101	44	17	14	7	5	0	2	0	1	0	1.3	0.83
90	3.1	765	55	57	57	26	17	11	4	5	2	1	0	0	0	0.6	0.63
120	3.2	731	35	56	61	37	26	21	12	8	3	3	5	1	1	0.9	0.64
150	7.7	315	28	74	109	82	71	68	60	45	66	43	22	11	5	5.2	1.30
180	19.7	125	49	128	174	151	112	85	59	39	45	21	7	4	2	5.2	1.62
210	7.1	347	92	179	169	91	49	27	19	8	11	5	2	0	0	3.1	1.36
240	4.1	593	49	91	91	67	36	30	23	6	8	5	0	1	0	1.9	0.93
270	5.1	473	42	86	123	102	63	39	27	19	18	6	2	1	0	3.1	1.19
300	6.0	431	37	82	119	100	75	60	39	22	29	5	1	0	1	3.6	1.29
330	12.8	198	48	103	161	147	115	81	58	32	39	14	4	1	0	4.9	1.73
Total	100.0	297	58	120	153	119	79	60	42	25	28	13	5	2	1	4.1	1.40

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.3	3.4	3.0	2.6	1.9	1.3	1.3	1.3	1.7	1.7	2.8	3.1	2.3
3	3.3	3.1	3.1	2.5	1.9	1.8	1.4	1.2	1.8	1.7	2.9	3.0	2.3
6	3.3	3.1	3.2	2.9	2.4	2.6	2.3	1.7	1.7	1.8	2.7	3.1	2.6
9	4.1	4.8	5.0	5.0	4.2	4.0	3.9	3.9	3.9	4.0	4.5	4.0	4.3
12	5.2	5.5	5.3	5.4	4.8	4.5	4.5	4.5	4.2	4.3	5.2	4.9	4.8
15	4.6	5.3	5.4	5.6	5.1	4.8	5.0	5.2	4.7	4.4	4.7	4.2	4.9
18	3.4	3.5	3.5	3.6	3.3	3.5	3.7	3.2	2.4	2.2	3.2	3.2	3.2
21	3.4	3.5	3.2	2.8	2.0	1.7	1.6	1.6	1.8	2.6	2.9	3.0	2.5
Day	3.8	4.0	3.9	3.8	3.2	3.0	3.0	2.8	2.8	2.8	3.6	3.6	3.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.3	7.0	5.1	1.8	1.5	7.6	8.8	7.4	4.7	4.9	6.0	8.1	6.9
	2.06	2.03	1.76	0.85	0.69	1.25	1.71	1.66	1.38	1.29	1.46	1.92	1.51
25	9.1	7.7	5.6	2.0	1.7	8.3	9.6	8.1	5.1	5.4	6.6	8.9	7.5
	2.11	2.10	1.81	0.87	0.70	1.26	1.73	1.69	1.42	1.33	1.49	1.96	1.53
50	9.7	8.2	6.0	2.2	1.9	8.9	10.3	8.6	5.5	5.8	7.1	9.5	8.1
	2.17	2.15	1.86	0.89	0.72	1.27	1.76	1.74	1.46	1.36	1.54	2.01	1.56
100	10.5	8.9	6.5	2.3	2.0	9.4	11.0	9.3	5.9	6.2	7.6	10.2	8.7
	2.11	2.08	1.80	0.87	0.70	1.27	1.74	1.71	1.42	1.33	1.50	1.97	1.55
200	11.5	9.9	7.1	2.5	2.1	10.0	11.8	10.1	6.5	6.8	8.3	11.1	9.4
	2.02	1.97	1.71	0.83	0.69	1.26	1.70	1.64	1.34	1.26	1.44	1.89	1.51
Freq	14.4	13.1	6.9	3.4	3.2	6.1	15.3	11.6	5.3	4.7	5.7	10.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	4.5	2.6	1.2	1.2	6.0	6.2	4.4	2.7	3.6	4.2	5.8	4.8
	1.77	1.74	1.13	0.76	0.66	1.26	1.60	1.39	1.02	1.17	1.27	1.72	1.34
25	6.9	5.3	3.2	1.5	1.5	7.0	7.3	5.3	3.3	4.3	5.1	6.9	5.7
	1.88	1.88	1.22	0.81	0.69	1.29	1.66	1.49	1.10	1.24	1.35	1.81	1.40
50	7.9	6.2	3.7	1.8	1.7	7.9	8.3	6.2	3.9	5.1	5.9	7.9	6.5
	2.07	2.12	1.37	0.89	0.72	1.33	1.75	1.66	1.22	1.38	1.47	1.97	1.50
100	9.2	7.4	4.5	2.2	2.1	8.9	9.5	7.3	4.7	6.0	6.9	9.2	7.7
	2.22	2.26	1.45	0.94	0.76	1.40	1.88	1.77	1.29	1.47	1.58	2.12	1.61
200	11.2	9.2	5.5	2.7	2.4	10.0	11.0	9.0	5.8	7.4	8.3	11.0	9.2
	2.13	2.15	1.38	0.90	0.74	1.38	1.83	1.69	1.24	1.41	1.51	2.04	1.59
Freq	15.1	12.3	5.0	3.2	3.2	7.1	18.1	8.7	4.5	5.0	5.9	11.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	3.8	1.8	0.8	1.0	5.4	5.4	3.5	2.2	3.2	3.7	5.1	4.1
	1.78	1.79	0.96	0.68	0.65	1.30	1.62	1.37	0.97	1.19	1.29	1.74	1.34
25	6.2	4.7	2.2	1.0	1.3	6.5	6.6	4.3	2.7	4.0	4.6	6.3	5.1
	1.88	1.91	1.02	0.72	0.67	1.32	1.67	1.46	1.03	1.26	1.36	1.82	1.39
50	7.2	5.5	2.7	1.3	1.5	7.4	7.6	5.2	3.3	4.7	5.4	7.3	6.0
	2.04	2.12	1.12	0.78	0.70	1.35	1.76	1.62	1.13	1.37	1.46	1.96	1.47
100	8.5	6.5	3.3	1.6	1.9	8.4	8.8	6.2	4.0	5.7	6.4	8.5	7.0
	2.24	2.33	1.23	0.84	0.75	1.42	1.92	1.77	1.23	1.51	1.60	2.15	1.60
200	10.2	8.1	4.0	2.0	2.2	9.6	10.2	7.6	4.9	6.9	7.7	10.2	8.4
	2.15	2.22	1.17	0.81	0.73	1.42	1.86	1.70	1.19	1.45	1.54	2.07	1.58
Freq	15.3	12.0	4.3	3.1	3.2	7.5	19.2	7.6	4.2	5.1	6.0	12.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	2.9	1.1	0.6	1.3	4.3	4.2	2.5	1.7	2.6	3.1	4.0	3.3
	1.78	1.78	0.84	0.65	0.74	1.35	1.63	1.36	0.95	1.21	1.36	1.76	1.35
25	5.1	3.8	1.5	0.8	1.7	5.5	5.5	3.4	2.3	3.4	4.1	5.3	4.3
	1.87	1.89	0.88	0.68	0.76	1.38	1.68	1.44	1.01	1.27	1.42	1.84	1.39
50	6.1	4.6	1.8	1.0	2.1	6.5	6.6	4.1	2.8	4.2	5.0	6.3	5.1
	2.00	2.05	0.95	0.73	0.77	1.41	1.75	1.56	1.08	1.36	1.52	1.96	1.46
100	7.3	5.5	2.3	1.3	2.5	7.6	7.7	5.0	3.5	5.1	6.0	7.5	6.2
	2.26	2.34	1.06	0.80	0.81	1.47	1.89	1.77	1.23	1.54	1.69	2.17	1.58
200	8.9	6.8	2.8	1.6	2.9	8.8	9.1	6.1	4.3	6.1	7.2	9.0	7.4
	2.19	2.25	1.03	0.78	0.82	1.50	1.90	1.71	1.18	1.49	1.65	2.14	1.59
Freq	15.1	11.2	3.8	3.1	3.5	8.7	18.7	6.8	4.2	5.2	6.5	13.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.2	395	4.4	166	3.8	110	3.0	52
25	6.8	504	5.2	256	4.7	188	3.9	111
50	7.2	597	5.9	343	5.4	267	4.7	176
100	7.8	754	6.9	485	6.3	380	5.5	262
200	8.5	1015	8.2	852	7.5	658	6.6	445

Grosseto

42° 45′ 00″ N 11° 04′ 00″ E	UTM 32 E 669142 m N 4735209 m	7 m a.s.l.

Location at the airport of Grosseto in central Italy, about 8 km from the coast. The city of Grosseto lies approx. 4 km E of the station. Within a radius of 10-20 km from the site the terrain surface is rather flat. Close to the station the surface is covered with grass and there are two rows of trees, one to the N and one to the S, approx. 300 m away. Farther away there are scattered houses, vineyards and olive orchards. The nearest hangars are 600 m away.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.10										
30	0.03	1500	0.30	3000	0.40								
60	0.03	1500	0.10	3000	0.40								
90	0.03	500	0.30	1000	0.10	4000	0.40						
120	0.05	2000	0.10										
150	0.05	2000	0.10										
180	0.05	2000	0.10										
210	0.05	1000	0.40	1500	0.10								
240	0.03	1000	0.05										
270	0.03	1500	0.20										
300	0.03	500	0.30	700	0.20								
330	0.03	1200	0.20										

Height of anemometer: 6.0 m a.g.l. Period: 65010103–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.3	481	140	124	93	59	38	27	19	8	11	2	0	0	0	2.1	1.01
30	16.8	306	202	144	84	59	51	44	33	27	34	9	4	2	0	2.8	1.02
60	9.0	482	184	131	63	39	28	21	13	12	15	6	4	0	0	1.8	0.86
90	5.4	732	114	70	48	16	7	8	2	1	2	1	0	0	0	0.7	0.70
120	6.8	548	91	82	82	49	37	41	28	14	18	7	4	0	0	2.1	0.89
150	10.9	344	81	101	104	81	74	70	48	31	41	18	5	2	0	3.9	1.26
180	7.3	517	41	58	71	65	63	67	43	28	24	16	4	1	0	3.0	1.05
210	8.2	480	86	115	118	89	42	32	15	8	11	3	1	0	0	2.5	1.12
240	9.7	408	96	154	181	104	34	11	6	1	3	1	0	0	0	2.6	1.49
270	6.6	572	62	109	86	63	38	24	16	8	10	6	3	1	0	2.0	0.91
300	5.4	633	64	68	61	54	35	28	21	9	13	6	6	1	0	1.6	0.77
330	5.5	667	82	80	70	45	27	13	6	4	4	2	0	0	0	1.1	0.78
Total	100.0	474	115	111	92	63	42	35	23	15	18	7	3	1	0	2.4	0.98

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	1.7	2.3	1.5	1.1	0.6	0.4	0.4	0.6	0.9	1.0	1.8	1.9	1.2
3	1.8	2.2	1.6	1.1	0.6	0.3	0.3	0.4	1.0	1.1	1.8	2.1	1.2
6	2.0	2.3	1.7	1.3	0.7	0.6	0.7	0.5	1.1	1.4	2.0	2.2	1.4
9	2.2	3.3	3.2	2.9	2.3	2.0	2.2	1.7	2.2	2.2	2.7	2.5	2.4
12	3.2	4.5	4.2	4.3	3.9	3.7	4.2	3.7	3.6	2.9	3.4	3.1	3.7
15	3.0	4.6	4.6	4.4	4.0	4.1	4.5	4.5	4.0	3.4	3.1	2.6	3.9
18	1.9	2.6	2.1	2.0	1.8	2.4	3.1	2.5	1.8	1.2	2.0	2.0	2.1
21	1.7	2.3	1.6	1.4	0.8	0.6	0.7	0.7	1.0	1.0	2.0	1.8	1.3
Day	2.2	3.0	2.6	2.3	1.9	1.8	2.0	1.8	1.9	1.8	2.4	2.3	2.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	4.9	4.1	2.4	2.9	6.1	6.0	4.8	4.4	4.1	3.2	2.4	4.2
	1.14	1.15	1.05	0.92	0.90	1.31	1.30	1.27	1.60	1.30	0.92	0.88	1.10
25	3.7	5.4	4.5	2.6	3.2	6.7	6.5	5.2	4.8	4.5	3.5	2.7	4.6
	1.18	1.17	1.07	0.94	0.92	1.34	1.32	1.30	1.65	1.34	0.93	0.90	1.12
50	4.0	5.8	4.8	2.9	3.5	7.2	7.0	5.6	5.2	4.8	3.8	2.9	5.0
	1.21	1.19	1.10	0.96	0.94	1.37	1.36	1.33	1.69	1.37	0.95	0.93	1.15
100	4.3	6.2	5.1	3.1	3.7	7.7	7.5	6.1	5.6	5.2	4.0	3.1	5.3
	1.17	1.17	1.07	0.94	0.92	1.35	1.33	1.30	1.64	1.33	0.94	0.90	1.13
200	4.7	6.7	5.5	3.3	3.9	8.3	8.1	6.6	6.2	5.7	4.3	3.4	5.8
	1.11	1.14	1.04	0.89	0.89	1.31	1.29	1.24	1.55	1.26	0.91	0.87	1.10
Freq	7.3	13.6	11.9	6.8	6.4	9.5	8.6	7.8	9.2	7.8	5.9	5.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	3.5	2.4	1.4	2.3	4.6	3.8	3.1	3.0	2.5	2.0	1.5	2.9
	1.02	1.04	0.90	0.81	0.87	1.24	1.10	1.12	1.43	0.96	0.79	0.80	0.98
25	3.0	4.2	3.0	1.7	2.8	5.5	4.6	3.8	3.6	3.0	2.4	1.9	3.4
	1.09	1.08	0.95	0.86	0.91	1.29	1.14	1.20	1.54	1.03	0.81	0.86	1.03
50	3.5	4.9	3.5	2.0	3.3	6.3	5.3	4.5	4.2	3.6	2.8	2.3	4.0
	1.22	1.15	1.02	0.95	0.98	1.38	1.21	1.34	1.73	1.15	0.86	0.95	1.10
100	4.3	5.7	4.2	2.5	4.0	7.2	6.1	5.4	5.0	4.4	3.3	2.8	4.8
	1.29	1.23	1.09	1.01	1.04	1.48	1.29	1.42	1.85	1.22	0.91	1.00	1.18
200	5.2	6.6	5.0	3.0	4.7	8.4	7.1	6.6	6.2	5.4	3.8	3.5	5.7
	1.24	1.19	1.05	0.97	1.01	1.43	1.26	1.37	1.76	1.17	0.89	0.96	1.15
Freq	8.0	15.8	9.9	5.8	6.7	10.5	7.7	8.1	9.6	6.9	5.5	5.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.1	3.1	2.0	0.9	2.2	4.1	3.2	2.7	2.6	2.1	1.7	1.3	2.5
	1.03	1.03	0.87	0.76	0.89	1.27	1.07	1.13	1.51	0.93	0.77	0.80	0.97
25	2.7	3.8	2.5	1.2	2.7	5.0	4.0	3.3	3.2	2.6	2.1	1.6	3.1
	1.10	1.07	0.92	0.80	0.93	1.31	1.11	1.21	1.61	0.99	0.80	0.85	1.01
50	3.3	4.4	3.0	1.5	3.2	5.8	4.6	4.0	3.8	3.2	2.5	2.0	3.6
	1.21	1.12	0.98	0.87	0.99	1.38	1.17	1.33	1.78	1.08	0.83	0.92	1.08
100	4.0	5.2	3.6	1.9	3.8	6.8	5.5	4.8	4.6	3.9	3.0	2.5	4.4
	1.32	1.22	1.07	0.95	1.07	1.51	1.27	1.45	1.96	1.17	0.90	1.00	1.17
200	4.8	6.1	4.3	2.3	4.5	8.0	6.4	5.9	5.6	4.8	3.5	3.0	5.2
	1.26	1.19	1.03	0.91	1.04	1.47	1.23	1.39	1.87	1.13	0.87	0.96	1.15
Freq	8.3	16.6	9.2	5.5	6.8	10.8	7.4	8.2	9.8	6.6	5.4	5.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	2.5	1.5	0.7	2.0	3.2	2.5	2.1	2.0	1.6	1.3	1.1	2.0
	1.03	1.05	0.88	0.72	0.96	1.27	1.06	1.16	1.42	0.90	0.77	0.84	0.99
25	2.5	3.2	2.0	1.0	2.6	4.2	3.2	2.8	2.7	2.1	1.7	1.5	2.6
	1.09	1.09	0.92	0.75	0.99	1.31	1.10	1.23	1.50	0.94	0.79	0.88	1.02
50	3.0	3.9	2.5	1.3	3.2	5.0	3.9	3.4	3.3	2.6	2.1	1.9	3.2
	1.17	1.13	0.98	0.80	1.04	1.37	1.15	1.33	1.63	1.01	0.82	0.95	1.08
100	3.8	4.7	3.2	1.6	3.9	6.0	4.7	4.2	4.0	3.3	2.6	2.4	3.9
	1.33	1.23	1.10	0.90	1.14	1.48	1.24	1.51	1.85	1.13	0.88	1.06	1.17
200	4.6	5.5	3.8	2.0	4.6	7.1	5.6	5.1	4.8	3.9	3.0	2.8	4.7
	1.28	1.23	1.06	0.87	1.13	1.48	1.24	1.46	1.79	1.09	0.88	1.03	1.17
Freq	9.2	16.0	8.6	5.6	7.2	10.5	7.4	8.5	9.3	6.4	5.4	5.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.1	195	2.9	92	2.5	60	2.0	29
25	4.4	243	3.4	137	3.1	101	2.6	60
50	4.7	283	3.9	172	3.5	136	3.1	90
100	5.1	366	4.5	234	4.1	181	3.7	127
200	5.6	510	5.5	429	5.0	326	4.4	220

Le Porte

42° 21′ 00″ N 10° 55′ 00″ E	UTM 32 E 657871 m	N 4690500 m	380 m a.s.l.

Located on the island of Giglio, approx. 25 km off the west coast of Italy. The meteorological mast is located in the middle of the island in a pass between peaks reaching 498 m and 487 m. The roughness description is very approximate due to lack of detailed topographical information.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10	3000	0.00									30	-23
30	0.10	2000	0.00									-15	
60	0.10	2000	0.00									25	24
90	0.10	1500	0.00									75	17
120	0.10	2000	0.00									104	
150	0.10	3000	0.00									87	-17
180	0.10	3000	0.00									30	-23
210	0.10	2000	0.00									-15	
240	0.10	2000	0.00									25	24
270	0.10	3000	0.00									92	15
300	0.10	3000	0.00									112	-1
330	0.10	3500	0.00									88	-17

Height of anemometer: 15.0 m a.g.l. Period: 83010300–87121100

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.0	65	85	160	224	185	127	83	37	20	8	3	1	1	1	4.6	1.98
30	5.3	84	146	206	238	187	81	33	11	4	4	1	3	0	0	3.9	2.08
60	6.2	113	127	210	215	160	99	32	25	8	8	1	2	1	0	3.9	1.86
90	5.7	104	115	157	194	161	118	73	36	16	19	7	0	2	0	4.4	1.84
120	23.8	48	57	91	92	107	87	94	80	78	109	69	39	23	27	7.7	1.66
150	13.6	57	68	89	75	87	84	85	82	83	120	70	41	26	37	8.1	1.65
180	1.3	218	48	87	83	154	88	31	112	52	105	14	0	0	6	5.5	1.57
210	2.2	38	55	174	234	169	116	56	72	25	14	41	7	0	0	4.9	1.58
240	2.0	118	106	267	191	161	36	41	31	20	0	0	24	4	0	3.8	1.29
270	4.1	74	98	171	186	113	106	69	47	58	41	9	5	10	12	4.9	1.36
300	15.3	71	93	125	144	105	112	82	70	51	59	28	22	13	22	5.9	1.33
330	13.4	57	67	99	104	111	104	117	91	79	93	45	22	9	4	6.8	1.91
Total	100.0	69	82	128	138	124	98	81	65	55	69	38	22	13	16	6.0	1.39

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.3	6.2	5.3	5.9	5.5	4.8	4.2	4.6	4.4	5.0	4.6	5.9	5.2
3	6.3	6.6	5.3	6.5	5.4	4.7	4.5	4.5	4.1	5.2	4.9	5.9	5.3
6	6.4	6.6	5.2	6.8	5.6	4.9	4.4	4.4	4.3	5.3	4.9	6.3	5.4
9	6.5	6.9	5.8	7.2	5.7	5.4	4.8	5.1	4.5	5.7	5.0	6.2	5.7
12	6.9	6.4	5.8	7.7	6.2	5.7	4.4	4.9	4.7	5.8	4.8	6.0	5.8
15	6.9	5.9	5.7	7.3	5.5	5.6	4.9	5.2	5.3	5.4	4.9	6.1	5.7
18	6.4	5.7	6.0	6.5	5.1	4.9	4.9	5.3	5.3	5.0	5.3	6.4	5.6
21	5.7	6.0	5.9	6.2	5.2	4.9	4.3	4.8	5.0	5.1	4.9	5.9	5.3
Day	6.4	6.3	5.6	6.8	5.5	5.1	4.6	4.8	4.7	5.3	4.9	6.1	5.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	5.8	4.2	4.7	4.6	5.2	7.5	6.8	4.5	3.7	3.5	4.3	5.1
	1.65	1.90	1.74	1.49	1.63	1.63	1.59	1.48	1.27	1.30	1.32	1.53	1.45
25	6.2	6.4	4.6	5.1	5.1	5.7	8.2	7.5	5.0	4.1	3.9	4.7	5.6
	1.70	1.96	1.79	1.54	1.68	1.68	1.62	1.51	1.31	1.34	1.36	1.58	1.49
50	6.7	6.9	5.0	5.5	5.4	6.2	8.8	8.0	5.4	4.4	4.2	5.0	6.0
	1.74	2.01	1.84	1.58	1.73	1.72	1.67	1.55	1.34	1.37	1.39	1.62	1.53
100	7.2	7.5	5.4	6.0	5.9	6.7	9.4	8.6	5.8	4.7	4.5	5.4	6.5
	1.69	1.95	1.78	1.53	1.67	1.67	1.63	1.51	1.30	1.33	1.35	1.56	1.49
200	8.0	8.2	5.9	6.6	6.5	7.3	10.3	9.4	6.3	5.2	4.9	6.0	7.1
	1.60	1.85	1.69	1.45	1.58	1.58	1.56	1.45	1.23	1.26	1.28	1.49	1.43
Freq	12.7	10.4	8.0	8.7	10.5	11.2	9.6	3.8	3.9	5.0	7.2	9.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	3.9	2.9	3.2	3.3	3.8	5.3	4.3	2.7	2.4	2.5	3.2	3.5
	1.44	1.54	1.38	1.28	1.37	1.30	1.41	1.23	1.05	1.10	1.17	1.30	1.25
25	4.8	4.7	3.5	3.9	3.9	4.6	6.3	5.2	3.3	3.0	3.1	3.8	4.2
	1.54	1.66	1.49	1.38	1.48	1.40	1.49	1.31	1.13	1.19	1.25	1.40	1.34
50	5.6	5.4	4.1	4.6	4.6	5.4	7.3	6.1	4.0	3.5	3.6	4.5	4.9
	1.74	1.86	1.67	1.54	1.65	1.57	1.61	1.44	1.26	1.32	1.40	1.57	1.47
100	6.7	6.4	4.8	5.4	5.5	6.5	8.5	7.2	4.8	4.2	4.3	5.4	5.9
	1.85	1.98	1.77	1.64	1.76	1.67	1.73	1.54	1.33	1.40	1.49	1.67	1.57
200	8.3	8.0	6.0	6.7	6.8	8.0	10.1	8.8	5.9	5.2	5.3	6.7	7.2
	1.76	1.89	1.69	1.57	1.68	1.60	1.66	1.48	1.27	1.35	1.42	1.60	1.53
Freq	12.4	10.2	8.0	9.1	10.6	10.6	8.4	3.7	4.3	5.6	7.6	9.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.3	2.6	2.8	2.9	3.4	4.7	3.6	2.4	2.1	2.3	2.8	3.0
	1.46	1.52	1.38	1.29	1.37	1.28	1.42	1.19	1.10	1.12	1.19	1.31	1.26
25	4.3	4.1	3.2	3.5	3.6	4.3	5.7	4.5	3.1	2.7	2.8	3.5	3.8
	1.56	1.63	1.48	1.38	1.46	1.37	1.48	1.27	1.17	1.19	1.27	1.40	1.33
50	5.1	4.8	3.8	4.1	4.2	5.1	6.7	5.3	3.7	3.2	3.4	4.2	4.5
	1.73	1.80	1.63	1.52	1.62	1.51	1.58	1.38	1.28	1.31	1.40	1.54	1.46
100	6.1	5.8	4.5	5.0	5.1	6.1	7.8	6.4	4.5	3.9	4.1	5.1	5.4
	1.90	1.98	1.79	1.67	1.77	1.66	1.73	1.52	1.40	1.43	1.53	1.69	1.59
200	7.6	7.1	5.6	6.1	6.3	7.5	9.3	7.8	5.5	4.7	5.0	6.2	6.6
	1.82	1.89	1.71	1.60	1.70	1.59	1.67	1.46	1.35	1.37	1.47	1.62	1.54
Freq	12.1	10.0	8.0	9.3	10.6	10.4	7.9	3.8	4.4	5.8	7.7	10.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.5	2.0	2.2	2.3	2.8	3.7	2.7	1.8	1.7	1.8	2.4	2.4
	1.49	1.48	1.32	1.32	1.38	1.27	1.42	1.15	1.05	1.13	1.20	1.35	1.26
25	3.7	3.3	2.7	2.9	3.1	3.8	4.8	3.5	2.4	2.2	2.4	3.1	3.2
	1.57	1.57	1.39	1.39	1.47	1.35	1.48	1.21	1.11	1.19	1.27	1.43	1.32
50	4.4	4.0	3.3	3.6	3.7	4.6	5.8	4.3	3.0	2.7	3.0	3.8	3.9
	1.71	1.70	1.51	1.51	1.59	1.46	1.56	1.31	1.20	1.29	1.38	1.55	1.42
100	5.4	4.9	4.0	4.4	4.6	5.6	6.9	5.3	3.7	3.4	3.7	4.7	4.7
	1.94	1.94	1.71	1.71	1.81	1.66	1.71	1.49	1.36	1.46	1.56	1.76	1.59
200	6.6	5.9	4.9	5.3	5.6	6.8	8.2	6.5	4.5	4.1	4.4	5.7	5.7
	1.87	1.87	1.65	1.65	1.74	1.60	1.70	1.44	1.31	1.41	1.51	1.70	1.55
Freq	11.7	9.7	8.2	9.6	10.7	10.2	7.1	3.8	4.6	6.1	8.0	10.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.6	170	3.2	75	2.8	50	2.2	24
25	5.0	215	3.9	114	3.5	84	2.9	50
50	5.4	256	4.5	150	4.1	117	3.5	78
100	5.9	337	5.3	227	4.8	174	4.2	116
200	6.5	480	6.5	448	5.9	337	5.2	218

Lecce Galatina

40° 39′ 00″ N 17° 57′ 00″ E	UTM 33 E 749435 m N 4504168 m	48 m a.s.l.

Location on the Salento plain in the Puglia region, 7 km from the village of Galatina and 20 km from the town of Lecce. The distance to the Adriatic Sea is 26 km and to the Ionian Sea 18 km. The dominant land-use around the airport is the cultivation of olive trees.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	500	0.20										
30	0.03	500	0.20										
60	0.03	500	0.20										
90	0.03	500	0.20										
120	0.03	500	0.20										
150	0.03	500	0.20										
180	0.03	500	0.20										
210	0.03	500	0.20										
240	0.03	500	0.20										
270	0.03	500	0.20										
300	0.03	500	0.20										
330	0.03	500	0.20										

Height of anemometer: 6.0 m a.g.l. Period: 65010106–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	13.4	213	40	87	118	101	105	106	83	44	70	24	7	3	0	5.5	1.74
30	10.5	257	70	132	184	119	87	70	35	19	16	9	3	0	0	4.0	1.58
60	4.8	590	60	116	131	51	29	11	3	2	6	0	1	0	0	1.7	0.99
90	4.0	706	32	73	89	25	25	17	13	6	11	4	0	0	0	1.1	0.71
120	6.4	418	60	132	126	76	46	45	26	12	28	17	10	4	1	3.2	1.06
150	12.4	222	61	136	136	91	76	65	48	36	64	38	21	5	3	4.8	1.28
180	8.5	323	37	91	89	78	80	80	63	45	67	27	14	5	0	4.9	1.38
210	6.3	449	47	93	126	81	62	59	25	17	24	10	4	2	1	3.3	1.16
240	7.8	342	50	101	145	108	75	61	41	22	34	15	5	1	0	4.0	1.37
270	6.2	446	47	115	127	89	62	42	28	11	17	13	3	0	1	3.1	1.16
300	7.2	381	75	156	143	82	56	46	21	14	18	6	1	0	1	3.1	1.25
330	12.5	233	60	123	141	101	84	74	60	40	52	22	9	3	0	4.7	1.42
Total	100.0	333	54	114	132	90	73	64	44	27	40	18	8	2	1	4.0	1.27

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.0	3.0	2.7	2.2	1.5	1.1	1.3	1.1	1.2	1.5	2.3	2.5	1.9
3	3.0	2.7	2.8	2.2	1.4	1.0	1.1	1.1	1.2	1.5	2.2	2.5	1.9
6	3.0	2.7	2.7	2.4	2.5	2.6	2.6	1.9	1.3	1.5	2.3	2.7	2.4
9	4.0	4.6	5.4	5.5	4.8	4.6	4.5	4.6	4.1	4.3	4.6	3.9	4.6
12	6.0	5.9	6.5	6.2	5.8	5.5	5.5	5.6	5.0	4.8	5.5	5.2	5.6
15	5.2	6.0	6.2	6.0	5.8	5.3	5.7	5.5	4.8	4.7	4.6	4.3	5.3
18	3.3	3.3	3.4	3.5	3.5	3.7	4.0	3.4	2.2	1.8	2.6	2.8	3.1
21	3.1	3.0	2.9	2.4	1.9	1.5	1.5	1.5	1.2	1.5	2.6	2.6	2.1
Day	3.8	3.9	4.1	3.8	3.4	3.2	3.3	3.1	2.6	2.7	3.3	3.3	3.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	8.0	5.7	2.7	4.9	7.7	8.4	6.8	6.8	6.3	5.7	7.6	7.1
	1.79	1.75	1.60	0.98	1.07	1.29	1.44	1.33	1.48	1.44	1.43	1.49	1.40
25	9.9	8.7	6.2	3.0	5.3	8.4	9.1	7.4	7.4	6.9	6.3	8.3	7.7
	1.81	1.79	1.65	1.01	1.08	1.31	1.45	1.35	1.51	1.47	1.47	1.51	1.42
50	10.6	9.3	6.7	3.3	5.7	9.0	9.7	7.9	7.9	7.4	6.7	8.8	8.3
	1.85	1.83	1.69	1.03	1.11	1.32	1.48	1.38	1.55	1.51	1.51	1.55	1.44
100	11.3	10.0	7.3	3.5	6.1	9.6	10.3	8.4	8.5	7.9	7.2	9.4	8.8
	1.83	1.80	1.64	1.00	1.10	1.32	1.47	1.37	1.52	1.48	1.47	1.53	1.43
200	12.2	10.9	8.0	3.8	6.5	10.2	11.0	9.1	9.2	8.6	7.9	10.1	9.5
	1.78	1.74	1.55	0.95	1.07	1.30	1.44	1.33	1.47	1.42	1.40	1.49	1.40
Freq	13.1	11.5	6.9	4.3	5.5	10.2	10.0	7.1	7.3	6.8	6.8	10.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	5.2	2.9	1.5	3.8	5.8	6.0	4.3	4.9	4.0	3.9	5.6	4.9
	1.69	1.56	1.14	0.77	1.03	1.26	1.37	1.17	1.35	1.20	1.25	1.39	1.27
25	7.9	6.2	3.6	1.9	4.5	6.8	7.0	5.1	5.8	4.8	4.7	6.6	5.9
	1.76	1.65	1.23	0.82	1.07	1.28	1.40	1.22	1.42	1.26	1.34	1.44	1.31
50	8.9	7.2	4.2	2.4	5.1	7.6	7.9	5.8	6.6	5.6	5.5	7.5	6.7
	1.85	1.80	1.37	0.91	1.12	1.32	1.46	1.29	1.52	1.37	1.49	1.51	1.38
100	10.1	8.4	5.1	2.9	5.9	8.6	9.0	6.8	7.7	6.6	6.6	8.6	7.7
	1.98	1.93	1.46	0.96	1.20	1.40	1.55	1.39	1.63	1.47	1.58	1.62	1.48
200	11.7	10.1	6.3	3.5	6.8	9.7	10.2	7.9	9.1	7.8	8.0	9.9	9.0
	1.93	1.86	1.39	0.92	1.17	1.38	1.51	1.35	1.58	1.41	1.52	1.57	1.46
Freq	13.3	10.9	5.6	4.1	6.1	11.6	9.0	6.6	7.6	6.4	7.1	11.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.9	4.4	2.2	1.3	3.4	5.2	5.2	3.6	4.3	3.4	3.4	5.0	4.3
	1.73	1.56	1.06	0.76	1.06	1.28	1.38	1.17	1.36	1.19	1.26	1.43	1.27
25	7.2	5.4	2.7	1.7	4.1	6.3	6.4	4.4	5.2	4.2	4.2	6.1	5.3
	1.79	1.65	1.13	0.80	1.08	1.31	1.42	1.21	1.42	1.24	1.33	1.48	1.31
50	8.2	6.4	3.3	2.1	4.8	7.1	7.3	5.2	6.1	5.0	5.0	7.1	6.1
	1.87	1.80	1.25	0.87	1.13	1.34	1.47	1.28	1.51	1.33	1.46	1.54	1.38
100	9.5	7.6	4.0	2.6	5.6	8.2	8.4	6.1	7.1	5.9	6.0	8.1	7.2
	2.04	1.98	1.37	0.94	1.22	1.41	1.56	1.40	1.65	1.46	1.60	1.68	1.49
200	11.0	9.2	4.9	3.1	6.5	9.3	9.6	7.1	8.4	7.0	7.3	9.4	8.4
	1.98	1.90	1.31	0.90	1.19	1.41	1.55	1.36	1.60	1.41	1.54	1.63	1.47
Freq	13.4	10.6	5.1	4.0	6.3	12.1	8.7	6.4	7.7	6.3	7.2	12.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	3.4	1.4	1.1	2.9	4.1	4.1	2.8	3.3	2.6	2.8	4.1	3.4
	1.73	1.56	0.98	0.77	1.09	1.31	1.38	1.17	1.36	1.18	1.27	1.48	1.28
25	6.0	4.4	1.9	1.5	3.7	5.3	5.3	3.7	4.4	3.5	3.7	5.3	4.4
	1.78	1.65	1.03	0.80	1.12	1.33	1.41	1.22	1.41	1.23	1.33	1.52	1.31
50	7.1	5.4	2.4	1.9	4.5	6.3	6.3	4.4	5.2	4.2	4.5	6.3	5.3
	1.85	1.78	1.11	0.84	1.15	1.36	1.45	1.28	1.48	1.31	1.43	1.58	1.37
100	8.3	6.5	3.0	2.4	5.3	7.4	7.3	5.3	6.3	5.1	5.5	7.4	6.3
	1.98	2.02	1.25	0.92	1.22	1.42	1.53	1.39	1.62	1.46	1.61	1.68	1.46
200	9.8	7.9	3.6	2.8	6.2	8.5	8.5	6.3	7.4	6.2	6.6	8.7	7.5
	2.00	1.95	1.21	0.90	1.24	1.45	1.56	1.39	1.61	1.43	1.56	1.70	1.48
Freq	13.2	10.1	4.7	4.2	6.8	12.1	8.4	6.4	7.7	6.3	7.6	12.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	497	4.6	212	4.0	140	3.1	67
25	7.0	629	5.4	326	4.9	238	4.1	140
50	7.5	742	6.1	429	5.6	335	4.9	222
100	8.0	923	7.0	576	6.5	457	5.7	324
200	8.7	1203	8.2	947	7.6	749	6.8	522

Milano

45° 26′ 00″ N	09° 17′ 00″ E	UTM 32	E 522163 m	N 5031223 m	103 m a.s.l.

Located at the airport of Milano in the Po valley. The city of Milano is approx. 2 km away between 270° and 360°. A small cemetery is located 30 m to the N-NE of the anemometer. Various airport structures are found 800 m away. The airport is entirely surrounded by buildings and these are more than 2 km from the anemometer.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30	200	0.03	1000	0.07	2000	0.40						
30	0.30	200	0.03	2200	0.40								
60	0.30	200	0.03	2200	0.40								
90	0.03	500	0.05	750	0.03	2000	0.40						
120	0.03	500	0.30	1000	0.03	2000	0.40						
150	0.03	2000	0.40										
180	0.03	2000	0.40										
210	0.03	2000	0.40										
240	0.03	2000	0.40										
270	0.03	750	0.05	1250	0.03	2000	0.40						
300	0.03	750	0.40	1000	0.05	2000	0.40						
330	0.03	2000	0.40										

Height of anemometer: 10.0 m a.g.l. Period: 66010100–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.2	752	62	38	39	27	13	17	22	10	12	4	3	0	0	0.7	0.59
30	6.7	792	94	53	28	12	7	7	2	4	1	0	0	0	0	0.5	0.64
60	8.1	704	181	75	27	6	3	1	2	0	0	0	0	0	0	0.8	0.90
90	9.2	624	206	96	48	15	6	2	2	0	0	0	0	0	0	1.1	0.98
120	8.5	639	180	97	49	18	7	4	3	2	0	0	0	0	0	1.0	0.90
150	7.4	753	166	51	20	6	2	1	0	0	0	0	0	0	0	0.8	0.98
180	7.2	778	135	59	23	2	2	0	0	0	0	0	0	0	0	0.8	1.00
210	10.8	552	227	137	62	13	4	2	1	1	0	0	0	0	0	1.3	1.14
240	13.1	432	222	184	103	42	10	4	2	1	1	0	0	0	0	1.9	1.31
270	8.2	667	103	97	78	27	14	8	4	1	0	0	0	0	0	1.0	0.84
300	6.5	810	55	46	31	17	13	9	6	5	4	2	2	0	0	0.4	0.53
330	7.2	732	50	39	37	22	16	25	25	20	21	7	4	1	0	0.9	0.61
Total	100.0	664	151	90	50	19	8	6	5	3	3	1	1	0	0	1.0	0.77

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	0.6	0.8	1.0	0.8	0.7	0.6	0.7	0.3	0.3	0.4	0.7	0.5	0.6
3	0.5	0.6	0.8	0.7	0.5	0.5	0.4	0.3	0.3	0.3	0.6	0.6	0.5
6	0.5	0.6	0.8	0.6	0.4	0.5	0.3	0.3	0.3	0.3	0.6	0.5	0.5
9	0.6	0.9	1.3	1.5	1.3	1.5	1.2	0.8	0.7	0.5	0.7	0.6	1.0
12	0.9	1.6	1.9	2.1	2.0	2.0	1.8	1.4	1.2	1.2	1.2	1.0	1.5
15	1.0	1.6	2.2	2.4	2.2	2.4	2.1	1.6	1.2	1.1	1.2	0.9	1.7
18	0.8	0.9	1.1	1.5	1.4	1.7	1.3	0.8	0.5	0.5	0.7	0.5	1.0
21	0.6	0.9	1.1	1.1	1.0	1.1	0.9	0.5	0.4	0.4	0.8	0.5	0.8
Day	0.7	1.0	1.3	1.3	1.2	1.3	1.1	0.7	0.6	0.6	0.8	0.6	0.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.4	1.3	1.7	1.9	2.0	1.7	1.5	1.9	2.6	2.5	1.6	1.2	1.7
	0.64	0.71	1.07	1.24	1.16	1.16	1.27	1.28	1.44	1.29	0.83	0.62	0.88
25	1.5	1.5	1.9	2.1	2.2	1.9	1.6	2.1	2.9	2.8	1.8	1.3	1.9
	0.65	0.73	1.10	1.27	1.20	1.20	1.31	1.32	1.48	1.33	0.85	0.62	0.91
50	1.6	1.6	2.0	2.2	2.3	2.1	1.7	2.3	3.1	3.0	1.9	1.4	2.1
	0.65	0.75	1.13	1.30	1.23	1.23	1.34	1.35	1.52	1.37	0.87	0.63	0.93
100	1.7	1.7	2.2	2.4	2.5	2.2	1.9	2.5	3.4	3.2	2.0	1.5	2.3
	0.65	0.73	1.09	1.26	1.19	1.19	1.30	1.31	1.47	1.33	0.85	0.63	0.92
200	1.8	1.8	2.3	2.6	2.7	2.4	2.0	2.7	3.7	3.5	2.2	1.6	2.5
	0.64	0.70	1.04	1.20	1.13	1.13	1.23	1.25	1.39	1.26	0.81	0.62	0.89
Freq	7.1	6.9	7.4	8.7	8.8	7.9	7.3	9.1	12.1	10.4	7.3	6.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.0	0.8	1.0	1.2	1.3	0.9	0.8	1.4	2.0	1.5	0.8	1.0	1.1
	0.61	0.67	0.92	1.01	0.95	0.89	0.94	1.11	1.26	0.99	0.64	0.60	0.77
25	1.2	1.1	1.3	1.5	1.6	1.1	1.0	1.7	2.4	1.8	1.0	1.2	1.4
	0.63	0.71	0.98	1.08	1.02	0.95	1.00	1.19	1.36	1.06	0.68	0.62	0.81
50	1.4	1.3	1.6	1.8	1.9	1.4	1.2	2.0	2.8	2.2	1.3	1.4	1.7
	0.66	0.78	1.09	1.21	1.14	1.06	1.12	1.33	1.52	1.18	0.74	0.64	0.88
100	1.7	1.6	1.9	2.2	2.3	1.6	1.5	2.4	3.3	2.6	1.6	1.6	2.1
	0.69	0.83	1.15	1.28	1.21	1.12	1.18	1.41	1.62	1.25	0.78	0.68	0.95
200	1.9	2.0	2.3	2.7	2.8	2.0	1.8	3.0	4.1	3.3	1.9	1.9	2.5
	0.68	0.80	1.10	1.23	1.16	1.07	1.13	1.35	1.54	1.20	0.75	0.66	0.94
Freq	7.1	6.8	7.8	9.0	8.6	7.6	7.2	10.1	12.7	9.1	6.8	7.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.8	0.5	0.8	1.0	1.0	0.8	0.8	1.2	1.8	1.1	0.5	0.9	0.9
	0.59	0.59	0.87	0.97	0.90	0.95	1.02	1.11	1.28	0.90	0.55	0.60	0.75
25	1.0	0.6	1.0	1.3	1.3	1.0	1.0	1.5	2.2	1.4	0.6	1.1	1.2
	0.61	0.62	0.92	1.03	0.96	1.02	1.09	1.18	1.37	0.95	0.58	0.62	0.78
50	1.1	0.8	1.3	1.6	1.6	1.3	1.2	1.9	2.6	1.8	0.8	1.3	1.4
	0.63	0.67	1.01	1.13	1.05	1.12	1.20	1.30	1.51	1.04	0.62	0.63	0.83
100	1.4	1.0	1.5	1.9	2.0	1.5	1.5	2.3	3.1	2.2	1.0	1.5	1.8
	0.67	0.72	1.10	1.23	1.14	1.22	1.31	1.42	1.66	1.14	0.67	0.67	0.91
200	1.6	1.2	1.9	2.3	2.4	1.9	1.8	2.8	3.8	2.6	1.2	1.7	2.2
	0.65	0.70	1.05	1.18	1.10	1.17	1.26	1.37	1.59	1.10	0.65	0.66	0.90
Freq	7.1	6.8	7.9	9.1	8.5	7.5	7.2	10.5	12.9	8.6	6.6	7.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.6	0.7	0.8	0.9	0.8	0.8	0.8	1.0	1.4	0.8	0.5	0.7	0.8
	0.60	0.80	1.05	1.02	0.90	1.19	1.21	1.15	1.31	0.85	0.59	0.62	0.79
25	0.8	0.9	1.1	1.2	1.1	1.1	1.1	1.4	1.9	1.1	0.6	1.0	1.1
	0.61	0.83	1.10	1.08	0.95	1.26	1.27	1.21	1.38	0.89	0.62	0.63	0.83
50	1.0	1.2	1.4	1.5	1.4	1.3	1.3	1.7	2.3	1.4	0.8	1.2	1.4
	0.63	0.90	1.19	1.17	1.02	1.37	1.38	1.31	1.50	0.95	0.65	0.65	0.87
100	1.2	1.5	1.7	1.8	1.8	1.6	1.6	2.1	2.8	1.7	1.1	1.5	1.7
	0.66	1.01	1.35	1.32	1.16	1.55	1.57	1.49	1.71	1.07	0.73	0.68	0.96
200	1.5	1.8	2.1	2.2	2.1	1.9	1.9	2.6	3.4	2.1	1.3	1.7	2.1
	0.67	0.98	1.30	1.27	1.12	1.49	1.51	1.44	1.65	1.04	0.70	0.69	0.97
Freq	7.2	6.8	8.2	9.1	8.5	7.4	7.4	10.9	12.8	8.1	6.5	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	1.9	32	1.3	17	1.1	11	0.9	5
25	2.0	39	1.6	24	1.3	18	1.2	11
50	2.2	46	1.8	29	1.6	23	1.5	16
100	2.4	60	2.1	39	1.9	29	1.7	21
200	2.6	87	2.6	75	2.3	55	2.1	37

Monte Arci

39° 45′ 00″ N	08° 48′ 00″ E	UTM 32	E 482865 m	N 4400104 m	780 m a.s.l.

Location at the top of a hill on a large plateau, 17 km from the gulf of Oristano at SW coast of Sardinia and in the southern part of the montainous region of Sardinia. In the S-W sectors the hilly region slopes down steeply towards the Campidano plateau. Around the mast the terrain is open but with big rocks, small bushes and small trees.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05											34	-2
30	0.05											35	3
60	0.05											44	4
90	0.05											53	2
120	0.05											52	-2
150	0.05											43	-4
180	0.05											34	-2
210	0.05											35	3
240	0.05											44	4
270	0.05											53	2
300	0.05											52	-2
330	0.05											43	-4

Height of anemometer: 15.0 m a.g.l. Period: 80062212–85042309

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.5	89	157	170	147	139	104	40	50	41	28	30	0	6	0	4.5	1.46
30	3.8	94	114	114	151	104	115	95	41	33	74	46	9	9	0	5.5	1.54
60	2.8	101	105	138	140	152	154	66	66	52	15	11	0	0	0	4.9	2.04
90	2.8	89	115	133	106	86	99	83	55	73	80	33	14	25	9	6.1	1.50
120	10.5	21	37	52	58	68	65	76	71	103	126	126	55	64	79	10.1	1.89
150	10.9	26	51	98	88	128	115	128	88	72	111	56	20	12	8	7.1	1.93
180	0.7	65	145	190	159	168	31	95	43	46	56	0	0	0	0	4.5	1.57
210	4.9	60	72	154	161	156	103	128	80	47	21	9	9	0	0	5.2	1.93
240	8.5	75	133	180	179	129	101	65	49	38	38	13	0	0	0	4.5	1.60
270	13.0	41	85	125	141	158	115	95	51	41	70	47	14	15	4	5.8	1.49
300	26.5	27	51	84	111	121	109	91	81	74	120	58	38	22	14	7.4	1.73
330	10.2	74	94	164	193	144	124	74	54	33	37	7	3	0	0	4.8	1.76
Total	100.0	49	79	117	128	126	107	88	67	60	82	48	21	17	14	6.3	1.49

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.8	5.3	6.5	5.8	5.2	5.1	5.0	4.7	5.0	6.9	5.2	7.0	5.7
3	8.1	5.2	6.6	5.9	5.4	5.2	5.2	4.7	5.3	7.0	5.2	6.9	5.8
6	8.3	5.3	6.7	5.8	5.3	4.8	5.1	4.5	5.0	6.7	5.0	6.7	5.7
9	8.5	5.5	6.2	5.6	5.7	4.7	5.1	4.0	4.8	6.6	5.2	6.5	5.6
12	8.5	5.4	6.3	5.8	6.1	5.0	5.9	5.2	5.2	6.7	4.9	6.8	5.9
15	8.2	5.2	6.3	5.6	6.2	5.2	5.6	5.7	5.6	6.7	5.0	6.5	5.9
18	8.2	5.2	6.3	5.5	5.4	5.2	5.0	4.6	4.8	6.5	4.8	6.5	5.6
21	8.3	5.5	6.2	5.6	5.7	5.1	5.2	4.2	4.8	6.6	5.2	6.9	5.7
Day	8.2	5.3	6.4	5.7	5.6	5.0	5.3	4.7	5.0	6.7	5.1	6.7	5.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	5.3	5.1	5.3	9.1	7.7	6.8	5.5	4.8	5.2	6.6	5.8	6.2
	1.76	1.72	1.91	1.76	2.12	2.07	2.05	2.15	1.88	1.74	1.94	1.81	1.76
25	5.4	5.8	5.6	5.8	9.9	8.5	7.5	6.0	5.2	5.7	7.3	6.3	6.7
	1.81	1.77	1.97	1.81	2.16	2.13	2.11	2.22	1.94	1.79	2.00	1.87	1.81
50	5.8	6.2	6.0	6.3	10.6	9.1	8.0	6.5	5.6	6.1	7.8	6.8	7.2
	1.86	1.82	2.02	1.86	2.22	2.19	2.17	2.28	1.99	1.84	2.06	1.91	1.85
100	6.3	6.7	6.5	6.8	11.4	9.9	8.7	7.0	6.1	6.6	8.5	7.4	7.8
	1.80	1.76	1.96	1.80	2.17	2.13	2.10	2.20	1.93	1.78	1.99	1.85	1.81
200	6.9	7.4	7.2	7.5	12.4	10.9	9.6	7.8	6.7	7.3	9.4	8.1	8.6
	1.71	1.67	1.86	1.71	2.10	2.01	1.99	2.09	1.83	1.69	1.88	1.76	1.73
Freq	8.2	4.9	3.2	2.6	7.6	10.3	4.4	4.6	7.9	10.9	20.3	15.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.8	3.4	3.8	6.5	5.1	4.5	3.7	3.2	3.7	4.7	3.7	4.3
	1.46	1.49	1.76	1.46	1.88	1.77	1.68	1.85	1.53	1.48	1.67	1.51	1.53
25	4.0	4.6	4.1	4.6	7.7	6.1	5.4	4.5	3.8	4.4	5.7	4.4	5.1
	1.57	1.60	1.90	1.58	1.98	1.91	1.81	1.99	1.65	1.60	1.81	1.63	1.63
50	4.7	5.4	4.7	5.3	8.8	7.0	6.3	5.2	4.5	5.2	6.6	5.1	5.9
	1.76	1.80	2.13	1.77	2.13	2.15	2.04	2.24	1.85	1.79	2.03	1.83	1.79
100	5.6	6.4	5.6	6.4	10.1	8.4	7.5	6.2	5.3	6.2	7.8	6.1	7.1
	1.87	1.92	2.27	1.88	2.29	2.29	2.17	2.39	1.97	1.91	2.16	1.94	1.91
200	6.9	8.0	7.0	7.9	12.0	10.4	9.3	7.7	6.6	7.7	9.7	7.6	8.7
	1.79	1.83	2.17	1.79	2.21	2.18	2.07	2.28	1.88	1.82	2.06	1.86	1.86
Freq	6.8	4.2	2.8	2.5	9.2	10.8	2.2	5.6	8.8	11.6	23.3	12.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.4	3.0	3.7	5.6	4.4	3.8	3.2	2.8	3.3	4.1	3.1	3.7
	1.48	1.50	1.74	1.46	1.84	1.75	1.66	1.79	1.54	1.46	1.68	1.50	1.52
25	3.6	4.2	3.7	4.6	6.8	5.4	4.7	3.9	3.5	4.1	5.1	3.9	4.6
	1.57	1.61	1.87	1.56	1.92	1.87	1.78	1.92	1.65	1.56	1.80	1.60	1.61
50	4.3	5.0	4.3	5.5	7.9	6.3	5.5	4.6	4.1	4.8	6.0	4.6	5.4
	1.74	1.77	2.06	1.73	2.05	2.07	1.97	2.12	1.82	1.73	1.99	1.77	1.76
100	5.2	6.0	5.2	6.6	9.1	7.6	6.6	5.5	5.0	5.8	7.2	5.5	6.5
	1.91	1.95	2.27	1.89	2.25	2.28	2.16	2.33	2.00	1.90	2.19	1.94	1.92
200	6.3	7.3	6.4	8.1	10.9	9.3	8.1	6.8	6.1	7.1	8.8	6.8	7.9
	1.83	1.87	2.17	1.81	2.17	2.18	2.07	2.23	1.92	1.82	2.09	1.86	1.87
Freq	6.5	4.0	2.8	2.9	9.4	10.4	2.1	6.0	9.1	12.3	23.0	11.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.6	2.4	3.4	4.2	3.5	2.8	2.5	2.3	2.8	3.2	2.5	2.9
	1.49	1.51	1.69	1.54	1.81	1.79	1.69	1.76	1.51	1.54	1.66	1.54	1.54
25	3.1	3.5	3.2	4.5	5.5	4.6	3.8	3.3	3.0	3.6	4.2	3.3	3.9
	1.58	1.60	1.79	1.63	1.88	1.90	1.79	1.87	1.60	1.63	1.76	1.63	1.62
50	3.8	4.3	3.8	5.4	6.6	5.6	4.6	3.9	3.7	4.4	5.1	4.0	4.7
	1.71	1.73	1.94	1.76	1.99	2.06	1.95	2.03	1.74	1.77	1.91	1.77	1.74
100	4.6	5.2	4.6	6.5	7.9	6.7	5.5	4.7	4.4	5.4	6.2	4.9	5.7
	1.94	1.97	2.21	1.99	2.20	2.35	2.22	2.31	1.98	2.02	2.17	2.02	1.94
200	5.6	6.3	5.6	7.9	9.4	8.2	6.7	5.8	5.4	6.6	7.5	5.9	6.9
	1.87	1.90	2.13	1.92	2.17	2.26	2.14	2.22	1.91	1.94	2.10	1.94	1.90
Freq	6.1	3.9	2.7	3.7	9.7	9.2	2.6	6.5	9.4	13.8	21.5	10.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.5	221	3.8	91	3.3	60	2.6	29
25	6.0	280	4.6	143	4.1	104	3.5	62
50	6.4	338	5.3	194	4.8	150	4.2	100
100	7.0	441	6.3	300	5.7	229	5.0	153
200	7.7	623	7.7	586	7.0	436	6.1	284

Olbia

40° 56′ 00″ N 09° 30′ 00″ E	UTM 32 E 542095 m N 4531556 m	2 m a.s.l.

Located at the airport 6 km south of Olbia in the northeastern part of Sardinia. The station lies at the mouth of a WSW-ENE oriented valley of the river Padrogiano. The mountain massifs bordering the valley reach heights of more than 1000 m. The sea lies to the northeast at a distance of 8000 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.05	3000	0.15							3	-1
30	0.03	1000	0.05	8000	0.01							-2	-5
60	0.03	1000	0.05	4000	0.15	8000	0.00					-11	-4
90	0.03	1000	0.05	4000	0.15	13000	0.00					-14	1
120	0.03	1000	0.05	3000	0.15							-8	5
150	0.03	1000	0.05	3000	0.15								4
180	0.03	1000	0.05	3000	0.15							3	-1
210	0.03	1000	0.05	3000	0.15							-2	-5
240	0.03	1000	0.05	3000	0.10							-11	-4
270	0.03	1000	0.05	3000	0.10							-14	1
300	0.03	1000	0.05	3000	0.10							-8	5
330	0.03	1000	0.05	3000	0.15								4

Height of anemometer: 10.0 m a.g.l. Period: 59010100–68123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.9	527	17	37	45	41	53	56	44	28	75	39	18	14	4	3.9	1.01
30	5.8	511	26	53	64	62	57	53	50	23	56	29	12	3	1	3.5	1.04
60	8.1	384	44	71	104	95	93	78	49	33	34	10	3	0	0	4.1	1.42
90	16.1	191	39	85	124	130	133	112	69	38	50	19	7	2	0	5.4	1.87
120	5.9	536	47	72	71	58	49	39	36	27	41	18	4	1	0	2.7	0.95
150	3.3	928	25	20	8	5	3	4	2	0	2	2	0	0	0	0.6	0.71
180	3.7	868	41	36	29	17	4	4	1	0	1	0	0	0	0	0.6	0.71
210	5.4	599	89	127	84	39	27	17	6	4	6	2	0	0	0	1.5	0.90
240	12.4	238	69	140	128	106	75	58	54	34	58	24	7	5	2	4.5	1.31
270	21.4	147	53	86	89	74	71	81	81	59	136	67	28	16	11	7.2	1.74
300	7.5	422	65	82	81	62	60	63	34	39	53	26	7	3	0	3.6	1.11
330	4.6	674	35	67	57	36	34	26	28	7	23	10	2	2	0	1.5	0.73
Total	100.0	373	49	83	88	76	71	65	51	34	63	29	11	6	3	4.3	1.21

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.0	2.9	3.2	2.3	1.9	1.5	1.7	1.8	1.4	1.7	2.4	3.2	2.2
3	3.0	2.9	2.9	2.1	1.9	1.4	1.6	1.6	1.2	1.7	2.3	3.0	2.1
6	2.9	2.6	2.8	2.2	2.0	1.6	1.8	1.7	1.2	1.5	2.0	2.9	2.1
9	3.2	3.2	4.5	4.3	4.6	4.7	4.8	4.4	3.3	2.4	2.8	3.4	3.8
12	5.1	5.4	6.7	7.0	6.8	6.9	7.4	7.4	6.5	5.3	4.7	5.1	6.2
15	5.4	6.3	7.2	7.1	7.0	6.9	7.4	7.4	6.4	5.3	4.8	5.2	6.4
18	3.3	4.0	4.8	4.8	4.8	5.2	5.6	5.3	3.7	2.5	2.6	3.4	4.2
21	3.3	3.2	3.4	2.6	2.4	2.2	2.2	2.3	1.5	1.8	2.3	3.4	2.5
Day	3.6	3.8	4.5	4.0	3.9	3.8	4.1	4.0	3.1	2.8	3.0	3.7	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	5.4	5.7	8.1	7.0	1.2	1.0	1.9	6.6	11.0	8.7	3.7	6.9
	1.00	1.13	1.28	1.73	1.54	0.62	0.84	0.91	1.33	1.66	1.40	0.95	1.23
25	5.3	5.9	6.3	8.8	7.7	1.3	1.2	2.1	7.2	11.9	9.5	4.1	7.5
	1.01	1.15	1.31	1.76	1.58	0.62	0.87	0.93	1.34	1.67	1.41	0.96	1.24
50	5.6	6.3	6.8	9.4	8.2	1.4	1.3	2.3	7.7	12.7	10.1	4.4	8.0
	1.02	1.17	1.35	1.81	1.62	0.63	0.88	0.95	1.37	1.69	1.43	0.99	1.26
100	6.0	6.7	7.3	10.1	8.8	1.5	1.4	2.4	8.3	13.5	10.7	4.7	8.6
	1.02	1.16	1.31	1.77	1.59	0.63	0.86	0.93	1.36	1.69	1.43	0.97	1.26
200	6.4	7.2	7.9	11.0	9.5	1.6	1.5	2.6	8.9	14.3	11.4	5.0	9.2
	1.00	1.13	1.26	1.71	1.53	0.62	0.82	0.88	1.32	1.67	1.41	0.95	1.24
Freq	4.8	5.3	7.5	14.6	9.1	3.9	3.1	4.3	10.3	19.9	11.8	5.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	3.6	3.9	5.8	3.3	0.3	0.6	1.5	5.0	8.4	4.5	1.8	4.8
	0.99	1.03	1.14	1.56	1.00	0.49	0.70	0.87	1.27	1.66	1.12	0.76	1.14
25	4.6	4.3	4.8	6.9	4.0	0.4	0.8	1.9	5.9	9.8	5.3	2.2	5.7
	1.02	1.07	1.21	1.64	1.04	0.51	0.75	0.93	1.31	1.69	1.15	0.79	1.17
50	5.2	5.0	5.6	7.9	4.6	0.5	0.9	2.3	6.7	10.9	6.0	2.6	6.5
	1.05	1.13	1.34	1.77	1.10	0.55	0.82	1.03	1.38	1.73	1.19	0.83	1.22
100	5.9	5.8	6.6	9.1	5.4	0.7	1.1	2.8	7.7	12.1	6.9	3.1	7.4
	1.12	1.21	1.43	1.90	1.18	0.58	0.87	1.09	1.49	1.81	1.27	0.88	1.28
200	6.7	6.7	8.1	10.9	6.3	0.8	1.4	3.4	8.9	13.6	7.9	3.6	8.6
	1.10	1.17	1.37	1.84	1.15	0.56	0.83	1.04	1.44	1.80	1.24	0.86	1.28
Freq	5.0	5.4	8.3	16.6	6.4	3.2	3.2	4.8	12.1	22.2	8.3	4.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.2	3.5	5.1	2.3	0.7	0.6	1.5	4.5	7.3	3.3	1.5	4.2
	1.02	1.05	1.17	1.56	0.88	0.75	0.74	0.87	1.27	1.67	1.06	0.75	1.14
25	4.2	3.9	4.4	6.2	2.9	0.9	0.8	2.0	5.5	8.8	4.1	1.9	5.1
	1.04	1.09	1.24	1.63	0.90	0.80	0.78	0.92	1.31	1.70	1.09	0.77	1.17
50	4.9	4.6	5.3	7.2	3.4	1.1	1.0	2.4	6.3	10.0	4.8	2.3	5.9
	1.07	1.14	1.35	1.75	0.95	0.87	0.85	1.00	1.37	1.74	1.14	0.81	1.21
100	5.7	5.4	6.3	8.4	4.0	1.3	1.2	3.0	7.3	11.3	5.6	2.8	6.9
	1.14	1.24	1.48	1.92	1.02	0.94	0.92	1.09	1.48	1.81	1.24	0.87	1.28
200	6.5	6.3	7.6	10.0	4.7	1.6	1.5	3.6	8.4	12.8	6.5	3.2	8.0
	1.13	1.21	1.42	1.85	1.00	0.90	0.88	1.05	1.45	1.83	1.21	0.85	1.29
Freq	5.1	5.5	8.7	16.8	5.7	3.0	3.2	5.1	12.7	22.5	7.3	4.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.6	3.0	3.9	1.7	0.7	0.7	1.7	3.9	5.7	2.6	1.4	3.3
	1.03	1.11	1.25	1.54	0.85	0.89	0.82	0.94	1.30	1.66	1.05	0.77	1.15
25	3.5	3.5	4.0	5.1	2.3	0.9	0.9	2.3	5.0	7.3	3.4	1.8	4.3
	1.05	1.14	1.31	1.60	0.87	0.94	0.86	0.98	1.33	1.68	1.08	0.80	1.18
50	4.2	4.2	4.9	6.2	2.7	1.2	1.2	2.9	6.0	8.6	4.0	2.2	5.2
	1.08	1.20	1.40	1.69	0.90	1.01	0.92	1.04	1.37	1.71	1.12	0.82	1.22
100	5.0	5.0	5.9	7.3	3.3	1.5	1.5	3.6	7.0	10.0	4.8	2.7	6.1
	1.13	1.30	1.57	1.85	0.96	1.14	1.04	1.17	1.44	1.77	1.19	0.87	1.28
200	5.8	5.9	7.1	8.7	3.9	1.8	1.8	4.3	8.1	11.5	5.7	3.2	7.2
	1.15	1.29	1.53	1.84	0.97	1.10	1.00	1.14	1.47	1.81	1.20	0.88	1.30
Freq	5.1	5.9	9.8	15.4	5.4	3.0	3.5	6.0	13.9	20.7	6.9	4.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	622	4.6	262	4.0	173	3.2	82
25	7.0	785	5.4	402	4.9	294	4.1	173
50	7.5	929	6.1	530	5.6	412	4.9	271
100	8.0	1133	6.9	701	6.4	560	5.7	397
200	8.6	1447	8.0	1095	7.4	871	6.7	618

Pisa

43° 41′ 00″ N	10° 23′ 00″ E	UTM 32	E 611501 m	N 4837720 m	2 m a.s.l.

Located in the airport of the city of Pisa, the distance to the city centre being 4 km in NW direction. In the same direction but 25-30 km away are the Apennine Mountains. The ground close to the station is rather flat and covered by grass and bushes. The airport buildings are situated W-NW of the mast about 2 km away. At the same distance are some dwellings and trees, and 300 m from the anemometer is a small pine forest.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	2000	0.50										
30	0.03	2000	0.40										
60	0.03	2000	0.40										
90	0.03	2000	0.40										
120	0.03	1000	0.05	1500	0.40								
150	0.03	500	0.30										
180	0.03	500	0.30										
210	0.03	1800	0.30										
240	0.03	2000	0.40										
270	0.03	2000	0.30										
300	0.03	2000	0.30										
330	0.03	900	0.50	1100	0.30								

Height of anemometer: 6.0 m a.g.l. Period: 65010103-75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.5	877	37	29	24	13	6	5	4	2	2	0	0	0	0	0.5	0.64
30	5.1	751	60	52	39	26	19	20	12	9	8	4	1	0	0	0.7	0.61
60	7.6	529	84	84	75	52	48	39	41	20	21	5	1	0	0	2.3	0.95
90	20.1	225	136	183	167	108	80	53	25	13	8	1	0	0	0	3.5	1.60
120	12.2	376	168	189	147	70	33	12	5	1	0	0	0	0	0	2.4	1.47
150	5.3	745	81	80	39	25	13	8	3	3	2	2	0	0	0	0.7	0.66
180	4.6	807	32	36	21	25	24	21	13	10	6	4	1	0	0	0.5	0.53
210	5.9	643	48	65	63	53	39	33	22	14	17	4	1	0	0	1.6	0.81
240	10.0	400	53	90	98	78	60	65	52	35	41	20	6	2	0	3.8	1.20
270	11.6	373	100	155	166	98	45	28	16	8	8	2	1	0	0	2.9	1.39
300	8.2	503	98	144	141	74	19	8	5	3	2	0	0	0	0	2.0	1.21
330	4.8	760	73	76	46	26	12	3	1	1	1	1	0	0	0	0.6	0.66
Total	100.0	485	96	122	110	68	42	30	19	11	10	4	1	0	0	2.4	1.07

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	1.8	2.1	1.7	1.2	0.7	0.5	0.4	0.6	0.8	1.1	2.0	1.8	1.2
3	1.9	2.1	1.7	1.3	0.6	0.6	0.5	0.5	1.0	1.1	2.0	1.8	1.2
6	1.8	2.3	1.9	1.4	0.9	1.0	0.8	0.8	1.0	1.2	2.2	1.9	1.4
9	2.4	3.1	3.2	2.8	2.1	2.0	1.9	2.1	2.6	2.6	3.0	2.6	2.5
12	3.2	3.8	3.9	3.7	3.4	3.4	3.5	3.4	2.9	2.6	3.4	3.0	3.3
15	2.6	3.6	4.0	4.1	3.7	3.6	3.8	3.8	3.3	2.7	2.6	2.6	3.4
18	1.8	2.0	1.6	1.9	1.5	1.8	2.0	1.5	0.8	0.8	1.8	2.0	1.6
21	1.8	2.1	1.6	1.2	0.6	0.4	0.3	0.5	0.8	1.0	1.9	1.8	1.2
Day	2.2	2.6	2.5	2.2	1.7	1.7	1.6	1.7	1.6	1.6	2.4	2.2	2.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.5	1.1	3.3	6.0	5.2	3.3	1.2	2.3	5.7	5.7	4.3	2.5	4.1
	0.87	0.63	0.95	1.77	1.80	1.33	0.64	0.80	1.22	1.46	1.56	1.12	1.18
25	1.6	1.2	3.6	6.5	5.7	3.6	1.3	2.5	6.3	6.2	4.8	2.8	4.5
	0.89	0.64	0.97	1.82	1.86	1.37	0.65	0.81	1.24	1.50	1.61	1.15	1.21
50	1.8	1.3	3.9	7.0	6.1	3.9	1.4	2.7	6.7	6.7	5.1	3.0	4.9
	0.91	0.66	0.99	1.87	1.91	1.40	0.67	0.83	1.26	1.54	1.65	1.17	1.23
100	1.9	1.4	4.2	7.6	6.7	4.2	1.5	2.9	7.2	7.2	5.6	3.2	5.2
	0.88	0.65	0.98	1.81	1.85	1.36	0.66	0.81	1.25	1.50	1.60	1.14	1.21
200	2.0	1.4	4.5	8.4	7.3	4.6	1.6	3.0	7.7	7.9	6.1	3.5	5.7
	0.84	0.63	0.94	1.72	1.75	1.29	0.64	0.79	1.21	1.42	1.51	1.08	1.17
Freq	4.6	4.9	6.6	14.8	15.4	8.3	4.9	5.4	8.4	10.8	9.6	6.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.8	1.0	2.6	4.2	3.2	1.7	1.0	1.8	4.4	3.7	2.7	1.4	2.8
	0.68	0.65	0.92	1.58	1.48	0.92	0.63	0.77	1.17	1.32	1.25	0.88	1.05
25	0.9	1.3	3.1	5.1	3.9	2.1	1.2	2.2	5.2	4.4	3.2	1.7	3.4
	0.72	0.68	0.96	1.70	1.59	0.99	0.65	0.81	1.21	1.42	1.35	0.94	1.11
50	1.2	1.5	3.7	5.9	4.6	2.5	1.4	2.6	5.9	5.2	3.8	2.1	4.0
	0.79	0.73	1.03	1.91	1.78	1.10	0.69	0.87	1.27	1.59	1.51	1.04	1.20
100	1.5	1.9	4.3	7.0	5.4	3.1	1.7	3.1	6.8	6.2	4.5	2.5	4.8
	0.83	0.77	1.10	2.03	1.90	1.17	0.73	0.92	1.37	1.69	1.60	1.10	1.28
200	1.8	2.2	5.1	8.7	6.7	3.8	2.0	3.6	7.9	7.7	5.6	3.1	5.8
	0.80	0.75	1.06	1.94	1.81	1.12	0.71	0.89	1.33	1.62	1.53	1.06	1.25
Freq	4.6	5.0	7.2	18.0	13.5	6.5	4.8	5.7	9.3	11.3	8.8	5.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.5	0.8	2.3	3.7	2.7	1.2	0.7	1.6	3.9	3.1	2.2	0.9	2.4
	0.62	0.62	0.94	1.60	1.47	0.83	0.60	0.80	1.19	1.35	1.25	0.77	1.04
25	0.7	1.0	2.9	4.6	3.3	1.6	0.9	2.0	4.8	3.9	2.8	1.2	3.0
	0.65	0.64	0.98	1.71	1.56	0.87	0.61	0.83	1.23	1.45	1.33	0.82	1.09
50	0.9	1.2	3.5	5.4	4.0	1.9	1.1	2.5	5.6	4.6	3.3	1.5	3.6
	0.70	0.67	1.04	1.89	1.73	0.95	0.63	0.88	1.29	1.60	1.47	0.89	1.16
100	1.1	1.5	4.2	6.4	4.7	2.4	1.4	3.0	6.5	5.5	4.0	1.9	4.3
	0.76	0.73	1.14	2.07	1.90	1.04	0.68	0.95	1.40	1.75	1.61	0.97	1.26
200	1.3	1.8	4.9	7.9	5.8	2.9	1.6	3.5	7.6	6.8	4.9	2.3	5.2
	0.73	0.70	1.10	1.98	1.82	1.00	0.67	0.92	1.36	1.68	1.54	0.93	1.23
Freq	4.5	5.1	7.4	19.1	12.8	5.9	4.7	5.8	9.7	11.5	8.5	5.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.6	0.7	2.1	2.9	2.0	0.6	0.5	1.5	3.1	2.4	1.6	0.6	1.9
	0.74	0.64	1.03	1.63	1.45	0.67	0.56	0.85	1.20	1.40	1.20	0.71	1.04
25	0.9	1.0	2.8	3.8	2.6	0.9	0.6	2.0	4.1	3.2	2.2	0.8	2.5
	0.77	0.66	1.08	1.73	1.53	0.70	0.57	0.88	1.24	1.49	1.27	0.75	1.08
50	1.1	1.2	3.4	4.7	3.2	1.1	0.8	2.4	4.8	3.9	2.7	1.1	3.1
	0.83	0.69	1.15	1.87	1.67	0.75	0.58	0.92	1.29	1.61	1.37	0.80	1.14
100	1.4	1.5	4.2	5.6	3.9	1.4	1.0	3.0	5.8	4.7	3.3	1.4	3.8
	0.92	0.74	1.28	2.13	1.89	0.83	0.61	1.01	1.38	1.83	1.56	0.89	1.24
200	1.7	1.8	5.0	6.9	4.8	1.7	1.2	3.6	6.8	5.8	4.0	1.7	4.6
	0.90	0.74	1.25	2.05	1.83	0.81	0.62	0.99	1.39	1.76	1.50	0.87	1.24
Freq	4.5	5.2	8.2	19.7	11.8	5.3	4.7	6.1	10.1	11.4	8.0	4.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	3.9	146	2.7	67	2.4	44	1.9	21
25	4.2	184	3.3	100	2.9	74	2.4	44
50	4.5	217	3.8	130	3.4	102	2.9	69
100	4.9	283	4.4	187	4.0	145	3.5	100
200	5.4	401	5.4	360	4.9	271	4.3	177

Ponza

40° 55′ 00″ N 12° 57′ 00″ E	UTM 33 E 327361 m N 4531608 m	184 m a.s.l.

Located on the small mountainous island of Ponza about 35 km from the Tyrrhenian coast of Italy. The island is mostly covered with 1-2 m high vegetation. The station is situated on top a hill and the anemometer on top of a building which measures 25 × 17 × 4.5 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30	2300	0.00									58	-15
30	0.20	2000	0.10									40	8
60	0.30	3500	0.10									99	18
90	0.20	2500	0.00									139	9
120	0.20	3800	0.00									150	-4
150	0.30	4200	0.00									122	-16
180	0.30											60	-15
210	0.35											45	8
240	0.30	4000	0.00									98	18
270	0.20	2000	0.00									136	9
300	0.20	3000	0.00									149	-4
330	0.25	2500	0.00									116	-16

Height of anemometer: 7.5 m a.g.l. Period: 65010100–74123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	2.3	635	74	78	81	46	31	16	11	10	8	3	1	3	2	1.4	0.75
30	2.0	720	88	64	35	36	16	13	9	0	9	5	2	2	2	0.8	0.59
60	5.7	267	92	107	138	132	84	68	57	21	27	4	1	2	0	4.2	1.56
90	12.8	116	57	99	144	147	134	110	85	39	44	16	7	3	1	5.5	1.91
120	11.8	132	69	105	131	139	104	95	85	47	54	23	10	2	2	5.5	1.70
150	6.8	224	111	150	168	125	66	62	31	25	22	12	5	0	0	4.0	1.44
180	5.6	235	69	115	122	91	78	74	57	43	67	27	8	10	4	4.9	1.34
210	4.4	308	76	111	129	90	61	60	48	25	55	20	9	4	3	4.1	1.19
240	4.4	321	96	111	125	84	56	39	52	21	40	23	10	10	12	3.9	1.04
270	17.1	107	68	101	129	122	94	76	57	42	74	48	38	23	20	6.2	1.33
300	22.2	84	57	97	131	121	100	90	69	53	76	52	35	20	16	6.5	1.46
330	5.0	312	111	172	146	95	57	31	21	15	19	11	3	3	3	3.3	1.15
Total	100.0	183	73	108	132	118	90	77	60	38	54	30	18	11	8	5.2	1.35

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.3	5.7	4.8	5.0	4.2	4.1	3.6	3.9	3.7	4.1	5.5	5.5	4.6
3	5.0	5.4	4.7	4.8	4.1	3.9	3.4	3.6	3.4	4.2	5.6	5.5	4.4
6	5.0	5.4	4.8	4.6	3.8	3.4	2.9	3.5	3.2	4.1	5.6	5.6	4.3
9	5.0	5.4	4.8	4.8	3.9	3.4	3.0	3.5	3.5	4.2	5.6	5.5	4.4
12	5.2	5.7	4.9	5.0	4.2	3.9	3.7	3.6	3.7	4.0	5.8	5.8	4.6
15	5.4	5.5	5.4	5.3	4.8	4.7	4.7	4.6	4.2	3.9	5.7	5.8	5.0
18	5.4	5.7	5.2	5.2	4.5	4.4	4.3	4.5	4.1	3.8	5.7	5.6	4.8
21	5.3	5.7	4.9	5.1	4.4	4.1	3.9	4.3	3.9	4.1	5.8	5.6	4.7
Day	5.2	5.6	4.9	5.0	4.2	4.0	3.7	3.9	3.7	4.0	5.7	5.6	4.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.8	5.5	3.9	3.6	3.7	6.1	6.5	5.1	4.2	4.2	4.2	4.5
	1.10	1.19	2.01	1.71	1.73	1.55	1.46	1.27	1.22	1.32	1.45	1.34	1.28
25	3.6	4.1	6.0	4.3	3.9	4.1	6.6	7.1	5.6	4.7	4.6	4.7	4.9
	1.14	1.23	2.07	1.76	1.78	1.60	1.49	1.29	1.25	1.36	1.49	1.38	1.31
50	3.9	4.5	6.5	4.6	4.2	4.4	7.1	7.6	6.1	5.0	4.9	5.0	5.3
	1.17	1.26	2.13	1.81	1.83	1.64	1.53	1.32	1.28	1.39	1.53	1.42	1.35
100	4.2	4.8	7.0	5.0	4.6	4.7	7.7	8.1	6.5	5.4	5.3	5.4	5.7
	1.13	1.23	2.06	1.75	1.77	1.59	1.49	1.31	1.25	1.35	1.48	1.37	1.32
200	4.5	5.3	7.8	5.5	5.1	5.2	8.3	8.7	7.1	5.9	5.9	5.9	6.3
	1.08	1.16	1.95	1.66	1.68	1.51	1.43	1.27	1.19	1.28	1.41	1.30	1.28
Freq	5.4	4.7	8.3	8.3	7.0	7.1	8.0	7.2	9.8	11.1	12.7	10.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	2.8	3.8	2.6	2.5	2.6	4.4	4.5	3.2	2.8	2.8	2.8	3.1
	0.86	1.10	1.74	1.59	1.45	1.22	1.29	1.15	1.07	1.15	1.23	1.11	1.13
25	2.2	3.4	4.6	3.1	3.0	3.2	5.3	5.3	4.0	3.4	3.5	3.5	3.7
	0.92	1.18	1.88	1.72	1.56	1.31	1.37	1.18	1.15	1.24	1.32	1.19	1.19
50	2.7	4.1	5.3	3.6	3.5	3.8	6.1	6.1	4.7	4.0	4.1	4.1	4.4
	1.02	1.32	2.12	1.93	1.76	1.47	1.48	1.24	1.29	1.39	1.48	1.33	1.31
100	3.3	4.9	6.3	4.3	4.2	4.5	7.2	7.0	5.7	4.8	4.9	4.9	5.2
	1.08	1.40	2.25	2.05	1.87	1.56	1.58	1.32	1.37	1.48	1.57	1.42	1.40
200	4.1	6.0	7.8	5.3	5.3	5.5	8.6	8.0	7.0	5.9	6.0	6.1	6.4
	1.03	1.34	2.15	1.96	1.79	1.49	1.52	1.29	1.31	1.41	1.50	1.35	1.37
Freq	4.5	5.1	9.2	7.8	6.8	7.0	8.3	7.5	10.5	11.3	12.6	9.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	2.7	3.2	2.2	2.2	2.4	3.9	3.8	2.7	2.5	2.5	2.5	2.7
	0.85	1.20	1.71	1.54	1.40	1.15	1.31	1.15	1.06	1.19	1.24	1.12	1.13
25	2.0	3.3	4.0	2.8	2.7	3.0	4.9	4.7	3.5	3.1	3.2	3.1	3.4
	0.90	1.28	1.83	1.65	1.49	1.23	1.37	1.18	1.13	1.27	1.32	1.20	1.20
50	2.5	4.0	4.7	3.3	3.2	3.6	5.7	5.4	4.2	3.7	3.8	3.8	4.0
	0.98	1.41	2.02	1.83	1.65	1.35	1.47	1.23	1.24	1.40	1.46	1.32	1.29
100	3.0	4.8	5.6	3.9	3.9	4.4	6.7	6.3	5.1	4.5	4.5	4.5	4.8
	1.07	1.55	2.22	2.01	1.81	1.48	1.61	1.33	1.36	1.54	1.60	1.44	1.42
200	3.7	5.9	6.9	4.8	4.8	5.3	8.0	7.3	6.2	5.5	5.6	5.6	5.9
	1.03	1.48	2.13	1.92	1.74	1.42	1.55	1.30	1.30	1.47	1.53	1.38	1.39
Freq	4.5	5.5	9.1	7.8	6.8	7.1	8.2	7.8	10.6	11.5	12.3	8.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.3	2.3	2.5	1.8	1.7	1.9	3.1	2.9	2.2	1.9	2.0	1.9	2.1
	0.85	1.33	1.68	1.52	1.40	1.06	1.29	1.15	1.09	1.17	1.21	1.08	1.13
25	1.8	3.0	3.3	2.3	2.3	2.6	4.1	3.8	2.9	2.6	2.6	2.5	2.8
	0.89	1.40	1.78	1.62	1.48	1.12	1.33	1.18	1.15	1.23	1.27	1.14	1.19
50	2.2	3.7	3.9	2.8	2.8	3.2	4.9	4.6	3.6	3.2	3.2	3.1	3.4
	0.96	1.52	1.94	1.75	1.60	1.21	1.41	1.23	1.24	1.33	1.38	1.23	1.27
100	2.8	4.5	4.8	3.4	3.4	4.0	5.9	5.5	4.4	3.9	4.0	3.8	4.2
	1.08	1.73	2.20	1.99	1.82	1.37	1.54	1.32	1.41	1.51	1.56	1.39	1.41
200	3.3	5.5	5.8	4.2	4.2	4.8	7.0	6.4	5.4	4.7	4.8	4.7	5.1
	1.04	1.66	2.12	1.92	1.76	1.33	1.53	1.33	1.36	1.46	1.51	1.35	1.40
Freq	4.5	6.0	9.1	7.6	6.9	7.2	8.0	8.3	10.8	11.8	11.8	8.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.2	154	2.9	70	2.6	46	2.0	22
25	4.5	193	3.5	105	3.2	77	2.7	46
50	4.9	229	4.0	135	3.7	106	3.2	71
100	5.3	298	4.7	196	4.4	151	3.8	103
200	5.8	425	5.8	379	5.3	285	4.7	187

San Gavino

40° 32′ 00″ N 08° 47′ 00″ E	UTM 32 E 481649 m N 4487055 m	20 m a.s.l.

Location 30 km from the W coast of Sardinia in the northern part of the Campidano plateau which runs in NW–SE direction from the west to the south coast. From 180° to 240° there are mountains at 14 km. Closer to the station the terrain is open and flat with low vegetation and scattered rows of trees. The anemometer is located 2 m due east of a building with approximate dimensions of 5 × 5 × 10 m.
Some small buildings at 200 m in the NW direction. The town of S. Gavino lies to the W–NW at a distance of 1 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.04												
30	0.03												
60	0.10	200	0.03										
90	0.03												
120	0.03												
150	0.03												
180	0.03												
210	0.03												
240	0.04												
270	0.40												
300	0.40												
330	0.07												

Height of anemometer: 15.0 m a.g.l. Period: 79121709–85010812

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.7	382	351	125	54	32	4	19	9	8	18	0	0	0	0	1.6	0.89
30	2.9	480	283	128	42	25	9	9	9	0	9	0	7	0	0	1.5	0.85
60	3.8	376	265	115	119	34	21	19	14	14	10	8	2	0	0	2.0	0.92
90	7.5	215	178	225	174	79	41	37	21	8	15	6	0	0	0	3.1	1.37
120	12.4	137	179	194	160	142	73	27	27	21	23	8	5	2	0	3.8	1.41
150	9.9	69	176	149	119	109	100	85	74	46	59	9	3	1	0	5.0	1.70
180	0.7	358	130	155	56	126	44	58	14	29	29	0	0	0	0	2.9	1.18
210	1.1	264	282	213	119	56	43	0	0	8	16	0	0	0	0	2.4	1.27
240	2.8	332	124	119	82	86	90	63	52	36	9	3	3	0	0	3.4	1.29
270	12.4	97	137	139	138	109	95	66	71	46	63	17	11	6	3	5.1	1.48
300	28.0	67	106	137	115	109	101	83	85	61	88	34	10	3	0	5.9	1.75
330	13.9	108	198	182	121	82	73	57	47	45	58	19	9	1	1	4.2	1.28
Total	100.0	147	169	157	123	97	77	58	54	39	52	17	7	2	1	4.3	1.34

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.8	3.0	3.3	2.8	2.3	2.5	3.6	2.6	2.3	3.0	2.5	2.8	2.9
3	3.6	3.0	3.1	2.7	2.2	2.3	3.2	2.4	2.0	2.9	2.3	2.6	2.8
6	3.7	2.6	3.1	2.6	2.1	2.0	3.2	2.4	1.7	3.0	2.4	2.8	2.7
9	4.1	3.1	3.9	4.0	4.0	3.8	5.0	4.8	3.7	5.4	2.8	2.9	3.9
12	5.8	5.1	6.1	5.4	5.4	6.0	6.7	6.3	5.2	6.5	4.1	4.7	5.6
15	5.9	5.8	6.6	6.6	6.5	7.2	6.5	8.0	7.5	7.3	4.0	4.5	6.3
18	4.1	3.9	4.5	4.9	4.6	5.4	5.0	6.8	5.2	3.9	3.0	2.9	4.5
21	3.7	2.9	3.5	3.3	2.7	2.7	3.4	3.3	2.4	2.9	2.8	2.8	3.1
Day	4.4	3.7	4.2	4.0	3.7	4.0	4.6	4.6	3.7	4.4	3.0	3.3	4.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	2.3	2.7	4.1	4.9	6.0	5.9	3.4	4.7	9.1	10.6	8.1	6.9
	1.13	1.00	1.06	1.51	1.59	1.77	1.79	1.40	1.48	1.54	1.83	1.54	1.34
25	4.5	2.5	3.0	4.5	5.4	6.6	6.5	3.8	5.1	9.9	11.5	8.8	7.5
	1.17	1.03	1.09	1.55	1.64	1.83	1.84	1.45	1.52	1.56	1.85	1.56	1.35
50	4.8	2.7	3.3	4.8	5.8	7.1	7.0	4.1	5.5	10.5	12.2	9.4	8.1
	1.19	1.06	1.11	1.60	1.69	1.88	1.89	1.48	1.56	1.58	1.87	1.60	1.38
100	5.2	2.9	3.5	5.2	6.3	7.7	7.6	4.4	5.9	11.2	13.0	10.0	8.6
	1.16	1.02	1.08	1.54	1.63	1.82	1.83	1.44	1.51	1.58	1.87	1.58	1.38
200	5.7	3.1	3.8	5.8	7.0	8.4	8.4	4.8	6.5	11.9	13.9	10.8	9.4
	1.11	0.98	1.03	1.47	1.55	1.73	1.73	1.37	1.43	1.55	1.83	1.54	1.37
Freq	7.3	3.5	3.5	6.4	11.0	10.8	3.4	1.0	2.3	9.5	23.4	18.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	1.4	1.8	2.9	3.5	4.5	3.3	2.2	3.2	6.6	7.6	4.6	4.8
	0.83	0.85	0.89	1.33	1.37	1.62	1.27	1.23	1.26	1.46	1.71	1.28	1.23
25	2.0	1.8	2.2	3.5	4.2	5.4	4.0	2.7	3.9	7.7	8.9	5.5	5.7
	0.88	0.91	0.95	1.43	1.47	1.74	1.37	1.32	1.35	1.49	1.76	1.34	1.28
50	2.5	2.2	2.7	4.1	4.9	6.3	4.7	3.2	4.6	8.7	10.0	6.3	6.5
	0.98	1.01	1.06	1.60	1.65	1.96	1.53	1.48	1.51	1.54	1.82	1.44	1.34
100	3.0	2.6	3.3	4.9	5.9	7.5	5.6	3.8	5.5	9.8	11.2	7.3	7.6
	1.03	1.07	1.13	1.71	1.76	2.08	1.63	1.57	1.61	1.65	1.94	1.54	1.43
200	3.7	3.2	4.0	6.1	7.3	9.3	6.9	4.8	6.8	11.1	12.7	8.7	9.0
	0.99	1.02	1.08	1.63	1.68	1.99	1.56	1.50	1.54	1.61	1.90	1.49	1.45
Freq	5.1	3.0	3.8	7.3	12.2	10.0	1.1	1.1	2.7	11.7	27.0	15.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.5	1.3	1.8	2.6	3.1	4.0	2.4	2.0	3.2	5.8	6.6	3.7	4.2
	0.94	0.87	0.98	1.35	1.39	1.66	1.18	1.19	1.24	1.47	1.71	1.27	1.25
25	1.9	1.7	2.3	3.3	3.9	5.0	3.0	2.5	3.9	7.0	7.9	4.6	5.2
	1.00	0.92	1.04	1.44	1.48	1.77	1.26	1.27	1.32	1.51	1.75	1.34	1.29
50	2.3	2.0	2.7	3.9	4.6	5.8	3.6	3.0	4.7	8.0	9.1	5.4	6.0
	1.10	1.01	1.15	1.60	1.63	1.96	1.39	1.40	1.46	1.55	1.81	1.44	1.35
100	2.8	2.5	3.3	4.6	5.5	7.0	4.3	3.6	5.7	9.1	10.3	6.4	7.1
	1.20	1.10	1.25	1.75	1.79	2.15	1.52	1.54	1.60	1.65	1.92	1.58	1.44
200	3.5	3.1	4.1	5.7	6.8	8.6	5.3	4.4	7.0	10.5	11.8	7.7	8.4
	1.15	1.06	1.20	1.68	1.72	2.06	1.46	1.48	1.53	1.64	1.91	1.52	1.47
Freq	4.6	3.0	4.0	7.8	12.2	9.4	0.7	1.2	3.0	12.8	28.0	13.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.2	1.1	1.6	2.1	2.5	3.2	1.8	1.7	3.2	4.6	5.0	2.8	3.3
	0.95	0.88	1.09	1.32	1.40	1.67	1.14	1.16	1.27	1.52	1.68	1.25	1.26
25	1.6	1.5	2.2	2.8	3.3	4.2	2.4	2.3	4.2	6.0	6.5	3.8	4.4
	1.00	0.93	1.15	1.39	1.49	1.77	1.21	1.23	1.32	1.55	1.71	1.31	1.29
50	2.0	1.8	2.7	3.4	4.1	5.1	2.9	2.8	5.0	7.1	7.7	4.6	5.2
	1.08	1.00	1.24	1.51	1.61	1.92	1.30	1.33	1.38	1.59	1.76	1.39	1.34
100	2.5	2.3	3.3	4.1	4.9	6.1	3.6	3.4	6.0	8.3	9.0	5.5	6.2
	1.22	1.12	1.41	1.72	1.83	2.19	1.48	1.51	1.51	1.67	1.85	1.55	1.42
200	3.0	2.8	4.0	5.0	6.0	7.5	4.3	4.1	7.1	9.6	10.4	6.6	7.4
	1.18	1.09	1.36	1.65	1.77	2.11	1.42	1.45	1.51	1.71	1.89	1.52	1.46
Freq	4.3	3.1	4.5	8.4	11.8	8.2	0.8	1.4	4.1	14.6	26.4	12.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.3	508	4.5	212	3.9	139	3.1	66
25	6.9	645	5.3	326	4.8	238	4.0	140
50	7.4	763	6.0	435	5.5	337	4.8	222
100	7.9	940	6.9	586	6.4	469	5.7	330
200	8.6	1211	8.1	941	7.6	748	6.7	523

San Gilla

39° 13′ 00″ N 09° 06′ 00″ E	UTM 32 E 508633 m N 4340899 m	1 m a.s.l.

Location in southern Sardinia, 7.5 km W of the town of Cagliari, from which it is separated by the Cagliari swamp. The station is situated in open terrain. Mountains of 300–800 m height occur about 12 km away in S-W directions. Near the station there is open water from N through S, grass and hedges from S through W and salinas from W through N.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	800	0.00	4500	0.05								
30	0.03	800	0.00	4000	0.05								
60	0.005	500	0.00	3500	0.05								
90	0.05	1000	0.001										
120	0.005	1000	0.00										
150	0.01	1500	0.005										
180	0.01												
210	0.05												
240	0.10												
270	0.05												
300	0.05												
330	0.03												

Height of anemometer: 15.0 m a.g.l. Period: 80122009–85030706

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	18.7	68	79	110	141	113	102	100	76	53	87	49	14	6	2	6.1	1.73
30	4.0	150	164	190	126	103	86	52	34	56	17	15	0	3	3	4.0	1.32
60	1.7	225	155	146	126	80	97	44	43	53	25	0	0	0	6	3.8	1.25
90	2.9	156	104	125	145	123	113	91	62	14	24	31	8	0	4	4.8	1.54
120	6.5	84	69	104	79	106	91	61	75	79	121	54	31	34	10	7.2	1.66
150	10.5	44	43	73	87	113	120	154	147	98	84	23	9	2	4	7.0	2.63
180	13.7	52	50	65	114	105	165	153	121	77	59	23	12	4	0	6.6	2.42
210	3.1	60	146	140	117	167	130	76	59	50	26	18	7	3	0	5.1	1.79
240	2.3	170	228	156	74	101	79	74	58	24	14	10	12	0	0	3.8	1.30
270	2.6	218	181	167	124	59	71	65	31	50	22	3	3	0	5	3.5	1.18
300	9.4	76	90	81	77	91	72	66	66	82	113	95	56	20	14	7.8	1.76
330	24.6	38	58	92	136	159	128	90	62	54	79	53	25	13	13	6.3	1.44
Total	100.0	72	80	100	117	120	115	99	80	64	75	43	19	9	6	6.3	1.67

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.3	4.8	5.6	4.2	4.9	4.8	5.1	4.8	4.5	4.3	5.1	5.4	4.9
3	5.5	5.1	5.7	4.3	5.0	4.4	4.9	5.1	4.7	4.1	4.7	5.5	4.9
6	5.6	4.6	5.3	4.3	5.1	4.4	4.8	4.8	4.9	4.2	4.8	5.2	4.8
9	5.4	4.6	5.8	4.5	5.3	5.4	5.1	4.6	5.0	4.9	4.9	5.5	5.1
12	6.6	5.5	6.5	6.5	6.7	7.2	7.3	6.3	6.9	5.9	5.9	6.4	6.5
15	7.0	6.4	7.3	7.6	7.0	7.5	7.6	7.5	7.6	6.4	6.0	6.1	7.0
18	5.8	6.0	6.9	6.6	6.3	6.5	6.6	6.6	6.5	5.2	5.7	4.9	6.2
21	5.6	5.5	6.3	4.9	5.3	5.0	5.3	5.0	4.9	4.5	4.6	5.3	5.2
Day	5.8	5.3	6.2	5.4	5.7	5.7	5.8	5.6	5.6	4.9	5.2	5.5	5.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	5.9	4.5	5.8	7.1	8.4	8.1	7.6	6.3	5.2	10.4	8.5	7.8
	1.87	1.71	1.46	1.73	1.62	2.82	2.82	2.40	1.67	1.38	1.83	1.59	1.75
25	8.1	6.5	4.9	6.3	7.8	9.1	8.9	8.3	6.9	5.7	11.4	9.3	8.5
	1.92	1.76	1.50	1.77	1.65	2.91	2.91	2.47	1.72	1.42	1.85	1.61	1.79
50	8.7	7.0	5.3	6.8	8.4	9.8	9.5	8.9	7.5	6.2	12.1	9.9	9.1
	1.97	1.81	1.54	1.82	1.70	2.99	2.99	2.54	1.76	1.46	1.88	1.65	1.83
100	9.4	7.5	5.7	7.4	9.0	10.6	10.4	9.7	8.1	6.6	12.9	10.6	9.8
	1.92	1.75	1.49	1.77	1.65	2.89	2.89	2.46	1.71	1.42	1.87	1.63	1.81
200	10.4	8.3	6.3	8.1	9.9	11.8	11.5	10.7	8.9	7.3	13.8	11.3	10.7
	1.82	1.66	1.42	1.67	1.58	2.74	2.74	2.33	1.62	1.34	1.84	1.59	1.77
Freq	19.9	6.8	2.2	2.7	5.8	9.7	13.1	5.1	2.4	2.5	8.1	21.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	3.3	3.0	4.2	5.1	5.8	5.6	5.0	4.0	3.8	7.4	5.9	5.4
	1.67	1.28	1.24	1.48	1.45	2.49	2.32	1.73	1.27	1.14	1.69	1.45	1.54
25	5.9	4.1	3.7	5.1	6.1	7.0	6.7	6.0	4.8	4.6	8.7	6.9	6.5
	1.80	1.38	1.34	1.59	1.55	2.69	2.50	1.87	1.36	1.20	1.73	1.50	1.62
50	6.8	4.8	4.4	5.9	7.1	8.0	7.7	6.9	5.7	5.3	9.7	7.8	7.4
	2.02	1.55	1.50	1.78	1.72	3.03	2.81	2.10	1.52	1.30	1.79	1.58	1.76
100	8.1	5.7	5.2	7.0	8.3	9.5	9.2	8.2	6.7	6.2	10.9	8.9	8.7
	2.15	1.65	1.59	1.90	1.83	3.22	3.00	2.23	1.62	1.39	1.92	1.70	1.90
200	10.1	7.0	6.4	8.7	10.2	11.9	11.4	10.2	8.3	7.4	12.5	10.4	10.5
	2.06	1.57	1.52	1.81	1.76	3.08	2.86	2.13	1.55	1.34	1.87	1.65	1.89
Freq	17.9	3.9	1.8	3.1	6.7	10.6	13.1	3.1	2.3	2.9	10.1	24.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	2.9	2.8	3.8	4.4	5.0	4.9	4.3	3.4	4.0	6.1	5.0	4.7
	1.67	1.29	1.30	1.47	1.50	2.42	2.33	1.67	1.24	1.22	1.61	1.45	1.54
25	5.3	3.7	3.5	4.7	5.5	6.2	6.1	5.3	4.2	4.9	7.4	6.2	5.8
	1.78	1.38	1.38	1.57	1.60	2.60	2.49	1.79	1.32	1.26	1.65	1.50	1.61
50	6.2	4.4	4.2	5.5	6.5	7.3	7.1	6.2	5.0	5.7	8.5	7.1	6.8
	1.98	1.52	1.53	1.74	1.75	2.87	2.76	1.98	1.45	1.32	1.71	1.57	1.72
100	7.4	5.3	5.0	6.6	7.7	8.6	8.4	7.4	6.0	6.7	9.7	8.2	8.0
	2.17	1.67	1.68	1.90	1.92	3.15	3.04	2.17	1.59	1.44	1.82	1.71	1.90
200	9.1	6.4	6.2	8.2	9.5	10.6	10.4	9.1	7.4	7.8	11.1	9.5	9.6
	2.08	1.60	1.61	1.82	1.84	3.02	2.90	2.08	1.52	1.40	1.80	1.67	1.88
Freq	16.5	3.7	1.9	3.5	7.0	10.9	12.2	3.0	2.4	3.4	11.5	24.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	2.3	2.3	3.1	3.5	3.9	3.9	3.3	2.6	3.7	4.5	4.0	3.7
	1.66	1.30	1.34	1.48	1.58	2.38	2.31	1.66	1.25	1.33	1.54	1.49	1.55
25	4.4	3.1	3.1	4.1	4.7	5.2	5.1	4.4	3.5	4.8	5.9	5.2	4.9
	1.76	1.37	1.42	1.56	1.67	2.53	2.45	1.76	1.32	1.36	1.57	1.53	1.62
50	5.3	3.8	3.8	5.0	5.7	6.2	6.1	5.3	4.3	5.7	7.0	6.1	5.9
	1.91	1.49	1.54	1.69	1.82	2.74	2.67	1.91	1.43	1.41	1.62	1.60	1.71
100	6.4	4.6	4.6	6.0	6.9	7.5	7.4	6.4	5.2	6.7	8.1	7.3	7.0
	2.17	1.69	1.75	1.93	2.07	3.13	3.04	2.17	1.62	1.50	1.71	1.73	1.88
200	7.9	5.6	5.6	7.3	8.4	9.1	9.0	7.8	6.4	7.9	9.5	8.6	8.4
	2.10	1.63	1.69	1.86	1.99	3.01	2.93	2.10	1.56	1.52	1.74	1.73	1.90
Freq	14.6	3.3	2.0	3.9	7.5	11.4	10.9	2.9	2.4	4.2	13.4	23.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.9	453	4.9	186	4.2	122	3.3	58
25	7.6	576	5.8	288	5.2	210	4.4	124
50	8.1	688	6.6	390	6.0	301	5.2	198
100	8.8	870	7.7	561	7.1	434	6.2	300
200	9.6	1169	9.3	995	8.5	760	7.5	513

Santa Anna

39° 50′ 00″ N 08° 41′ 00″ E	UTM 32 E 472902 m N 4409382 m	40 m a.s.l.

Location 11 km from the SW coast of Sardinia in the northern part of the Campidano plateau. The terrain is open and flat with scattered trees and cereal cultivation. In the S-E sectors there are mountains at a distance of 5 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.06											-1	4
30	0.06											3	
60	0.06												-3
90	0.06											-7	-4
120	0.06											-11	
150	0.03											-7	3
180	0.03											-1	3
210	0.03											3	
240	0.03												-3
270	0.03											-6	-3
300	0.03											-10	
330	0.03											-7	3

Height of anemometer: 30.0 m a.g.l. Period: 80062118–85012406

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.8	343	217	113	76	49	49	46	34	20	35	13	4	0	0	2.7	0.97
30	7.8	344	153	128	92	72	46	47	47	21	41	5	3	0	0	3.0	1.10
60	5.9	430	196	147	79	56	27	20	15	17	10	3	0	0	0	2.0	0.98
90	5.2	461	217	58	71	42	39	25	32	12	14	14	4	8	2	1.9	0.76
120	5.4	412	143	70	36	45	45	31	40	30	42	21	24	31	32	3.7	0.87
150	4.9	259	195	111	63	78	42	50	53	40	37	33	14	11	16	4.0	1.03
180	12.8	326	185	124	114	85	70	32	27	14	14	6	2	0	0	2.9	1.18
210	6.9	210	177	150	110	90	57	75	62	28	30	5	3	1	2	3.8	1.29
240	9.0	225	174	128	128	106	75	62	43	28	20	9	2	0	0	3.8	1.40
270	13.8	141	120	104	134	127	130	87	63	36	28	21	7	2	1	5.0	1.69
300	13.7	132	103	102	77	86	91	79	75	69	93	44	23	16	9	6.4	1.58
330	7.8	300	185	108	85	52	48	44	64	32	48	17	11	4	1	3.4	1.06
Total	100.0	272	163	113	95	81	69	55	49	31	37	17	8	5	4	3.8	1.14

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.6	3.3	4.1	2.2	1.8	1.6	2.5	1.5	2.3	3.0	3.7	4.2	2.8
3	3.5	3.4	4.0	2.3	2.1	1.8	1.5	1.6	1.8	2.6	3.2	3.4	2.6
6	3.9	3.5	3.7	2.0	1.9	2.0	1.4	1.4	2.0	3.1	3.4	3.7	2.7
9	4.1	3.8	4.0	3.1	3.1	3.2	4.0	2.8	2.6	3.2	3.7	3.8	3.5
12	5.3	5.2	5.4	5.1	5.2	4.8	5.4	4.9	4.2	4.5	4.5	4.8	5.0
15	5.5	6.0	6.3	5.6	5.5	4.9	4.7	4.8	4.9	4.7	4.7	4.7	5.2
18	4.3	4.0	4.9	3.9	3.6	3.1	3.1	3.0	3.0	3.4	3.7	3.7	3.6
21	4.1	3.6	4.0	2.6	1.9	1.6	2.4	2.0	2.2	3.0	3.9	4.0	2.9
Day	4.3	4.1	4.5	3.3	3.1	2.9	3.1	2.8	2.9	3.4	3.9	4.0	3.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.7	2.9	2.6	4.1	4.6	3.7	3.9	4.4	5.9	7.5	5.8	4.7
	1.08	1.17	1.09	0.87	0.83	0.98	1.19	1.31	1.48	1.72	1.60	1.30	1.15
25	4.1	4.1	3.2	2.9	4.5	5.1	4.1	4.3	4.8	6.4	8.2	6.3	5.2
	1.12	1.20	1.12	0.89	0.83	0.99	1.23	1.35	1.52	1.77	1.63	1.33	1.17
50	4.4	4.4	3.5	3.2	4.8	5.4	4.4	4.6	5.2	6.9	8.8	6.8	5.6
	1.14	1.23	1.15	0.91	0.84	1.01	1.26	1.38	1.57	1.82	1.68	1.36	1.20
100	4.7	4.7	3.8	3.4	5.1	5.8	4.8	5.0	5.6	7.5	9.5	7.3	6.0
	1.11	1.19	1.11	0.88	0.84	1.00	1.23	1.34	1.52	1.76	1.65	1.33	1.19
200	5.1	5.1	4.1	3.6	5.4	6.1	5.2	5.4	6.2	8.2	10.2	7.9	6.5
	1.05	1.13	1.06	0.85	0.83	0.98	1.16	1.27	1.44	1.67	1.59	1.28	1.16
Freq	7.0	6.8	5.9	5.5	5.9	6.1	10.1	7.9	7.7	12.4	14.7	9.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.5	1.8	1.7	3.4	3.2	2.3	2.9	3.0	4.2	5.6	3.0	3.2
	0.92	1.02	0.91	0.74	0.84	0.95	1.08	1.17	1.26	1.50	1.46	0.98	1.03
25	2.8	3.1	2.2	2.0	4.0	3.8	2.9	3.5	3.6	5.1	6.7	3.6	3.9
	0.98	1.10	0.97	0.77	0.85	0.98	1.15	1.26	1.35	1.62	1.53	1.04	1.08
50	3.4	3.7	2.6	2.5	4.5	4.4	3.4	4.2	4.3	5.9	7.6	4.3	4.5
	1.09	1.23	1.08	0.83	0.86	1.04	1.29	1.41	1.52	1.82	1.63	1.15	1.16
100	4.1	4.4	3.2	3.0	5.1	5.2	4.1	5.0	5.1	7.0	8.7	5.1	5.4
	1.16	1.30	1.15	0.88	0.89	1.11	1.37	1.50	1.61	1.94	1.75	1.23	1.24
200	5.0	5.4	3.9	3.5	5.7	6.0	5.1	6.2	6.3	8.7	10.3	6.2	6.5
	1.11	1.24	1.10	0.85	0.89	1.08	1.31	1.43	1.54	1.85	1.69	1.17	1.23
Freq	6.6	6.9	5.6	5.5	5.9	6.1	11.8	6.3	8.3	13.7	14.9	8.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	2.2	1.5	1.5	3.0	2.6	2.1	2.6	2.7	3.7	4.8	2.5	2.8
	0.92	1.02	0.90	0.74	0.85	0.94	1.09	1.19	1.28	1.47	1.46	0.97	1.04
25	2.5	2.7	2.0	1.9	3.7	3.3	2.6	3.2	3.4	4.6	5.9	3.1	3.5
	0.98	1.08	0.96	0.76	0.86	0.98	1.16	1.27	1.37	1.57	1.51	1.02	1.08
50	3.1	3.3	2.4	2.3	4.2	3.9	3.1	3.9	4.0	5.5	6.9	3.8	4.1
	1.08	1.19	1.05	0.80	0.87	1.04	1.27	1.40	1.51	1.74	1.60	1.12	1.15
100	3.8	4.0	2.9	2.8	4.8	4.6	3.8	4.7	4.9	6.6	8.0	4.6	5.0
	1.17	1.30	1.15	0.87	0.90	1.13	1.40	1.54	1.65	1.90	1.75	1.22	1.24
200	4.6	4.9	3.6	3.3	5.4	5.4	4.7	5.7	6.0	8.1	9.4	5.6	6.0
	1.13	1.25	1.10	0.84	0.90	1.09	1.34	1.48	1.58	1.83	1.70	1.17	1.24
Freq	6.6	6.8	5.6	5.5	6.0	6.6	11.4	6.4	8.7	13.9	14.5	8.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	1.7	1.3	1.4	2.4	1.9	1.7	2.0	2.3	3.0	3.7	1.9	2.2
	0.95	1.01	0.89	0.77	0.86	0.92	1.13	1.19	1.33	1.44	1.42	0.96	1.04
25	2.2	2.2	1.7	1.9	3.1	2.5	2.3	2.7	3.0	4.0	4.8	2.6	2.9
	1.01	1.06	0.94	0.78	0.87	0.95	1.19	1.26	1.40	1.52	1.48	1.01	1.08
50	2.7	2.8	2.1	2.3	3.7	3.1	2.8	3.3	3.7	4.9	5.8	3.2	3.6
	1.08	1.15	1.01	0.81	0.88	1.01	1.29	1.36	1.52	1.65	1.54	1.09	1.14
100	3.4	3.4	2.7	2.8	4.3	3.8	3.5	4.1	4.5	5.9	6.9	4.0	4.4
	1.23	1.30	1.13	0.86	0.91	1.11	1.46	1.54	1.73	1.87	1.68	1.23	1.25
200	4.1	4.2	3.2	3.3	5.0	4.5	4.3	4.9	5.5	7.2	8.2	4.8	5.3
	1.18	1.26	1.10	0.87	0.93	1.09	1.40	1.49	1.67	1.80	1.68	1.19	1.25
Freq	6.7	6.7	5.5	5.5	6.0	7.5	10.5	6.7	9.4	14.0	13.8	7.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.5	237	3.2	108	2.8	70	2.2	34
25	4.9	299	3.8	162	3.4	119	2.9	70
50	5.2	351	4.3	209	3.9	163	3.4	109
100	5.7	452	5.0	291	4.6	226	4.1	156
200	6.2	622	6.1	525	5.6	402	4.9	271

Santa Caterina

39° 06′ 00″ N	08° 29′ 00″ E	UTM 32	E 455321 m	N 4328074 m	1 m a.s.l.

Location near the coast on the SW tip of Sardinia, facing the islands of S. Antioco and S. Pietro. The area around the station is flat and consists of the sea and marsh.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05												
30	0.05												
60	0.05												
90	0.05												
120	0.05												
150	0.05	1000	0.00	10000	0.10								
180	0.05	1000	0.00										
210	0.01												
240	0.05	100	0.00	5000	0.10								
270	0.05	100	0.00	5000	0.10								
300	0.05	100	0.00										
330	0.05	100	0.00	5000	0.01								

Height of anemometer: 15.0 m a.g.l. Period: 81012915-86022803

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.2	124	74	169	194	188	94	55	44	20	17	14	3	4	0	4.5	1.65
30	2.9	247	306	238	101	48	24	23	2	2	4	4	0	0	0	2.4	1.27
60	5.0	325	375	181	77	16	15	2	6	0	2	0	0	0	0	1.9	1.35
90	11.6	144	227	324	173	60	23	19	11	8	9	3	0	0	0	2.9	1.49
120	8.4	153	178	220	131	57	42	50	41	36	53	27	11	1	0	3.6	1.08
150	6.2	138	112	96	81	77	74	107	90	92	94	27	7	4	0	6.1	1.88
180	7.7	110	97	102	103	124	133	129	106	51	35	10	1	0	0	5.5	2.22
210	4.4	143	122	157	130	134	133	72	52	39	13	5	0	0	0	4.5	1.83
240	3.6	182	154	128	121	90	83	61	46	58	61	15	0	2	0	4.4	1.39
270	6.2	126	109	113	120	115	90	69	73	59	74	40	8	1	2	5.4	1.57
300	16.4	58	53	51	70	90	89	98	92	89	165	73	33	17	21	8.3	2.04
330	24.6	30	32	40	61	75	76	89	109	91	157	108	65	32	36	9.4	2.11
Total	100.0	112	120	128	101	84	73	73	71	59	88	47	23	11	12	6.0	1.44

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.6	4.5	4.5	4.2	4.0	3.8	3.7	3.7	3.5	3.5	4.0	6.0	4.2
3	5.4	4.3	4.3	4.0	3.9	3.7	3.3	3.6	3.2	3.3	4.0	5.8	4.1
6	5.4	4.1	4.2	3.8	3.6	4.1	3.2	3.5	3.3	3.4	3.6	5.5	3.9
9	5.8	4.4	5.1	5.9	5.6	6.8	5.5	5.6	4.8	4.1	4.4	5.6	5.2
12	7.5	6.7	7.0	7.6	7.4	8.3	7.5	7.7	6.9	6.3	6.4	6.8	7.1
15	7.8	6.9	7.5	8.1	7.0	8.4	7.9	8.1	7.5	6.6	6.3	6.2	7.4
18	5.9	5.3	5.8	6.7	5.7	7.0	6.9	7.2	5.8	4.7	4.6	5.4	5.9
21	5.6	4.3	5.1	4.7	4.6	4.6	4.9	4.7	3.9	3.6	4.2	5.9	4.6
Day	6.1	5.1	5.4	5.7	5.3	5.9	5.3	5.5	4.9	4.4	4.7	5.9	5.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.2	3.9	2.8	4.0	4.7	6.9	6.2	5.7	5.0	5.9	7.8	9.6	6.7
	2.01	1.44	1.54	1.71	1.19	1.87	2.09	2.20	1.70	1.80	1.98	2.34	1.64
25	9.0	4.3	3.0	4.4	5.1	7.5	6.8	6.3	5.5	6.4	8.6	10.5	7.4
	2.06	1.48	1.58	1.76	1.22	1.93	2.15	2.28	1.75	1.85	2.05	2.39	1.67
50	9.6	4.6	3.3	4.8	5.5	8.1	7.3	6.7	5.9	6.9	9.2	11.3	7.9
	2.12	1.52	1.62	1.81	1.25	1.98	2.21	2.34	1.80	1.90	2.10	2.46	1.71
100	10.4	5.0	3.5	5.1	5.9	8.8	7.9	7.3	6.4	7.5	10.0	12.1	8.5
	2.06	1.48	1.57	1.75	1.22	1.92	2.14	2.26	1.74	1.84	2.03	2.40	1.68
200	11.4	5.4	3.9	5.7	6.4	9.7	8.8	8.1	7.0	8.3	11.0	13.2	9.3
	1.98	1.40	1.49	1.66	1.17	1.81	2.03	2.14	1.65	1.75	1.93	2.32	1.63
Freq	6.7	2.9	4.5	10.3	9.1	6.7	7.4	5.0	3.8	5.7	14.7	23.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	2.2	1.9	2.9	3.6	5.0	4.2	3.8	3.4	4.4	5.6	6.9	4.7
	1.57	1.21	1.29	1.39	1.10	1.81	1.80	1.73	1.38	1.58	1.71	2.06	1.46
25	5.2	2.7	2.3	3.5	4.3	6.1	5.1	4.5	4.1	5.3	6.7	8.2	5.6
	1.69	1.31	1.39	1.50	1.15	1.96	1.94	1.87	1.48	1.70	1.84	2.16	1.53
50	6.0	3.2	2.7	4.1	5.0	7.0	5.9	5.2	4.8	6.2	7.8	9.3	6.4
	1.90	1.46	1.56	1.68	1.25	2.20	2.19	2.10	1.66	1.91	2.05	2.33	1.65
100	7.1	3.8	3.3	4.8	5.9	8.3	7.0	6.2	5.8	7.3	9.2	10.6	7.6
	2.03	1.55	1.66	1.79	1.33	2.34	2.33	2.24	1.77	2.03	2.19	2.50	1.76
200	8.9	4.7	4.0	6.0	7.1	10.3	8.7	7.7	7.1	9.1	11.3	12.6	9.2
	1.94	1.49	1.58	1.71	1.29	2.24	2.22	2.14	1.69	1.94	2.10	2.41	1.72
Freq	3.2	3.0	5.4	11.4	8.3	6.3	7.4	4.4	3.8	7.0	16.9	22.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	1.9	1.9	2.6	3.3	4.3	3.7	3.3	3.1	4.1	5.0	6.0	4.1
	1.52	1.24	1.33	1.35	1.16	1.82	1.79	1.71	1.41	1.66	1.73	2.08	1.47
25	4.4	2.4	2.3	3.2	4.1	5.4	4.5	4.0	3.8	5.1	6.2	7.3	5.0
	1.63	1.32	1.43	1.44	1.22	1.95	1.91	1.82	1.51	1.77	1.84	2.17	1.54
50	5.3	2.8	2.8	3.8	4.9	6.3	5.3	4.8	4.5	6.0	7.2	8.5	5.9
	1.80	1.46	1.57	1.59	1.31	2.15	2.12	2.02	1.67	1.96	2.01	2.32	1.65
100	6.3	3.4	3.3	4.6	5.8	7.5	6.3	5.7	5.4	7.1	8.5	9.8	7.0
	1.98	1.60	1.73	1.74	1.44	2.37	2.32	2.22	1.83	2.15	2.21	2.54	1.79
200	7.7	4.2	4.1	5.7	6.9	9.3	7.8	7.0	6.7	8.8	10.4	11.7	8.5
	1.89	1.53	1.65	1.67	1.38	2.27	2.22	2.12	1.75	2.06	2.12	2.46	1.76
Freq	3.2	3.3	6.0	11.0	8.1	6.4	7.2	4.3	4.0	7.8	17.6	21.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	1.5	1.6	1.9	2.8	3.4	2.8	2.5	2.5	3.4	4.0	4.7	3.2
	1.45	1.27	1.40	1.18	1.23	1.85	1.74	1.64	1.44	1.73	1.75	2.08	1.47
25	3.5	2.0	2.2	2.6	3.7	4.4	3.7	3.3	3.3	4.5	5.3	6.1	4.2
	1.54	1.34	1.48	1.24	1.29	1.96	1.84	1.74	1.52	1.83	1.84	2.16	1.53
50	4.3	2.4	2.6	3.2	4.4	5.3	4.5	4.1	4.0	5.4	6.3	7.3	5.1
	1.67	1.45	1.61	1.35	1.38	2.12	2.00	1.89	1.65	1.99	1.97	2.28	1.62
100	5.2	3.0	3.2	3.9	5.4	6.4	5.5	4.9	4.9	6.6	7.6	8.7	6.1
	1.90	1.65	1.83	1.52	1.54	2.42	2.28	2.15	1.88	2.27	2.22	2.50	1.78
200	6.3	3.6	3.9	4.7	6.5	7.9	6.7	6.0	6.0	8.0	9.2	10.3	7.4
	1.83	1.59	1.76	1.47	1.50	2.33	2.19	2.08	1.81	2.18	2.15	2.48	1.76
Freq	3.2	3.6	6.9	10.5	7.8	6.7	6.7	4.2	4.4	9.1	18.5	18.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	321	4.2	130	3.7	86	2.9	41
25	6.6	409	5.0	204	4.5	149	3.8	88
50	7.1	489	5.8	278	5.3	215	4.6	141
100	7.6	631	6.8	415	6.2	321	5.5	216
200	8.4	868	8.2	772	7.6	587	6.6	386

Scopeto

42° 23′ 00″ N 10° 54′ 00″ E	UTM 32 E 656415 m N 4694171 m	180 m a.s.l.

On the island of Giglio, approx. 25 km off the west coast of Italy. The meteorological mast is located in the northern part of the island on a ridge oriented NW-SE with the coast only a few km away in most directions.
The roughness description is very approximate due to lack of detailed topographical information.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10	800	0.00									28	21
30	0.10	600	0.00									60	10
60	0.10	1000	0.00									71	-7
90	0.10	1200	0.00									40	-21
120	0.10	2000	0.00									-7	-20
150	0.10	7000	0.00									-16	15
180	0.10	4500	0.00									41	24
210	0.10	3500	0.00									86	11
240	0.10	2000	0.00									84	-7
270	0.10	1000	0.00									39	-20
300	0.10	1000	0.00									-9	-18
330	0.10	1000	0.00									-15	14

Height of anemometer: 15.0 m a.g.l. Period: 83010300-86122600

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.6	45	128	153	166	151	134	79	51	33	24	18	12	7	0	5.0	1.61
30	18.9	29	70	127	104	95	65	80	72	56	119	65	44	31	43	7.8	1.53
60	12.7	38	115	132	166	132	99	89	76	64	56	15	10	2	6	5.4	1.60
90	7.4	40	114	175	210	203	113	75	25	16	19	10	0	0	0	4.5	2.01
120	11.4	8	50	115	228	199	162	110	51	27	36	9	5	0	0	5.3	2.09
150	5.0	24	42	136	178	209	136	61	92	52	26	27	9	7	0	5.4	1.63
180	0.2	0	0	249	297	237	218	0	0	0	0	0	0	0	0	4.3	3.47
210	12.9	18	41	83	87	115	90	94	59	63	125	87	65	42	30	8.5	1.74
240	9.2	40	98	161	224	144	85	58	24	26	52	26	27	16	17	4.6	1.09
270	5.3	78	164	171	138	134	63	52	22	27	41	41	39	14	15	4.5	1.06
300	3.2	135	264	342	127	47	31	0	14	6	17	18	0	0	0	2.7	1.13
330	4.1	91	258	303	166	87	28	4	11	17	19	8	3	0	4	2.9	1.11
Total	100.0	38	98	147	158	138	97	76	52	42	63	36	25	15	15	5.6	1.29

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.4	6.7	6.0	5.1	6.2	4.3	3.7	3.7	4.5	5.4	4.5	7.3	5.4
3	6.7	7.2	6.0	5.7	5.9	4.3	4.1	4.5	4.8	5.4	5.0	7.4	5.5
6	6.1	7.2	6.6	5.6	6.5	4.3	3.8	4.0	3.9	4.8	5.0	7.3	5.4
9	6.2	6.8	6.3	5.6	5.8	4.2	3.6	4.2	4.4	4.6	5.3	7.3	5.3
12	6.1	6.7	6.1	5.5	5.8	4.5	3.7	4.6	4.7	4.8	5.0	7.1	5.3
15	6.0	6.6	6.0	5.3	5.9	5.3	4.3	5.0	5.3	5.0	4.5	7.0	5.5
18	6.6	6.6	6.2	5.7	5.6	4.5	3.7	3.7	4.5	5.0	4.5	7.2	5.3
21	7.4	6.7	6.3	5.5	5.9	4.4	3.2	3.6	4.8	5.2	4.6	6.8	5.3
Day	6.6	6.8	6.2	5.5	6.0	4.5	3.8	4.2	4.6	5.0	4.8	7.2	5.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	5.2	3.8	4.3	6.6	8.1	7.7	5.6	3.2	3.9	4.3	5.5	5.5
	1.36	1.48	1.56	1.56	1.99	1.67	1.71	1.61	1.13	1.09	0.95	1.29	1.37
25	6.4	5.8	4.2	4.7	7.2	8.9	8.4	6.2	3.6	4.3	4.7	6.0	6.1
	1.40	1.52	1.62	1.61	2.05	1.70	1.75	1.66	1.16	1.12	0.97	1.33	1.40
50	6.9	6.2	4.5	5.1	7.8	9.5	9.0	6.6	3.9	4.7	5.1	6.5	6.5
	1.43	1.56	1.66	1.65	2.11	1.74	1.79	1.71	1.19	1.15	0.99	1.37	1.43
100	7.4	6.7	4.9	5.5	8.4	10.2	9.7	7.2	4.2	5.0	5.4	7.0	7.0
	1.39	1.52	1.60	1.60	2.04	1.71	1.75	1.65	1.15	1.12	0.98	1.33	1.40
200	8.1	7.3	5.3	6.0	9.3	11.0	10.6	7.9	4.5	5.4	5.7	7.6	7.7
	1.33	1.44	1.52	1.52	1.93	1.65	1.68	1.56	1.10	1.06	0.95	1.26	1.35
Freq	13.6	10.3	6.3	8.1	14.9	6.6	7.7	6.0	4.5	6.1	6.2	9.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	3.4	2.7	3.5	4.7	5.8	5.0	3.5	2.3	2.6	3.2	3.7	3.8
	1.15	1.23	1.36	1.43	1.62	1.51	1.40	1.29	0.97	0.91	0.92	1.11	1.19
25	4.7	4.1	3.3	4.2	5.6	6.9	6.0	4.3	2.8	3.3	3.8	4.5	4.6
	1.24	1.33	1.47	1.54	1.75	1.58	1.49	1.39	1.04	0.97	0.96	1.19	1.26
50	5.6	4.8	3.8	5.0	6.5	7.8	6.9	5.0	3.4	3.9	4.4	5.3	5.4
	1.39	1.49	1.65	1.73	1.96	1.69	1.63	1.55	1.15	1.08	1.03	1.33	1.39
100	6.7	5.8	4.6	5.9	7.8	9.1	8.1	6.0	4.1	4.8	5.2	6.4	6.4
	1.48	1.58	1.75	1.84	2.09	1.82	1.75	1.65	1.23	1.15	1.10	1.41	1.49
200	8.3	7.2	5.7	7.3	9.7	10.7	9.9	7.4	5.0	5.8	6.1	7.9	7.8
	1.41	1.51	1.67	1.76	2.00	1.76	1.68	1.58	1.17	1.10	1.06	1.35	1.44
Freq	13.0	9.2	6.6	9.4	13.6	6.6	7.4	5.6	4.8	6.1	7.0	10.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	2.9	2.4	3.2	4.1	5.0	4.3	2.9	2.1	2.3	2.9	3.3	3.3
	1.17	1.22	1.39	1.48	1.60	1.50	1.39	1.21	0.99	0.90	0.96	1.13	1.19
25	4.2	3.6	3.0	4.0	5.1	6.1	5.3	3.6	2.6	2.9	3.6	4.1	4.1
	1.24	1.30	1.48	1.58	1.71	1.57	1.47	1.29	1.05	0.95	1.00	1.20	1.26
50	5.1	4.3	3.6	4.8	6.1	7.1	6.2	4.3	3.2	3.6	4.2	4.9	4.9
	1.37	1.43	1.64	1.75	1.90	1.67	1.60	1.42	1.15	1.04	1.06	1.32	1.37
100	6.1	5.2	4.3	5.7	7.2	8.3	7.4	5.2	3.9	4.4	5.0	5.9	5.9
	1.50	1.57	1.80	1.92	2.08	1.83	1.76	1.55	1.26	1.13	1.15	1.45	1.50
200	7.5	6.4	5.3	7.0	8.9	9.8	9.0	6.4	4.8	5.3	5.9	7.3	7.2
	1.44	1.51	1.72	1.84	1.99	1.77	1.69	1.49	1.21	1.09	1.12	1.39	1.46
Freq	12.7	8.8	6.8	9.9	12.7	6.7	7.2	5.5	4.9	6.1	7.3	11.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	2.2	1.9	2.7	3.3	3.9	3.2	2.2	1.6	1.9	2.3	2.6	2.6
	1.18	1.22	1.35	1.56	1.60	1.51	1.37	1.19	0.94	0.92	1.00	1.13	1.21
25	3.5	3.0	2.5	3.6	4.4	5.1	4.3	2.9	2.2	2.6	3.1	3.5	3.5
	1.25	1.29	1.42	1.65	1.69	1.57	1.45	1.26	0.99	0.96	1.04	1.20	1.26
50	4.3	3.6	3.1	4.4	5.4	6.1	5.2	3.6	2.7	3.2	3.8	4.3	4.2
	1.35	1.39	1.54	1.79	1.84	1.66	1.56	1.37	1.07	1.03	1.10	1.30	1.36
100	5.3	4.4	3.8	5.3	6.5	7.3	6.3	4.4	3.4	4.0	4.7	5.3	5.2
	1.53	1.58	1.75	2.04	2.09	1.83	1.77	1.55	1.21	1.16	1.22	1.47	1.52
200	6.5	5.4	4.6	6.5	7.9	8.6	7.7	5.3	4.1	4.8	5.6	6.4	6.3
	1.48	1.52	1.69	1.96	2.02	1.81	1.71	1.49	1.16	1.12	1.20	1.42	1.48
Freq	12.2	8.4	7.0	10.8	11.5	7.0	7.1	5.4	5.2	6.1	7.7	11.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.1	249	3.6	112	3.1	73	2.5	35
25	5.5	313	4.2	168	3.8	123	3.2	74
50	5.9	372	4.9	218	4.5	170	3.9	114
100	6.4	487	5.8	323	5.3	248	4.7	166
200	7.1	690	7.1	637	6.5	477	5.7	311

Trapani

37° 55′ 00″ N 12° 30′ 00″ E	UTM 33 E 280231 m N 4199586 m	7 m a.s.l.

Located at Trapani airport, 2.5 km from the W coast of Sicily. The terrain around the anemometer is mostly flat and covered by grass. In the E sector there is a mountainous region (600–800 m a.s.l.) 10 km away.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10												
30	0.10												
60	0.20												
90	0.25												
120	0.25												
150	0.05												
180	0.05	2000	0.30										
210	0.20												
240	0.20												
270	0.05												
300	0.05												
330	0.05												

Height of anemometer: 10.0 m a.g.l. Period: 70010103–75123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	13.6	143	79	116	141	151	138	90	58	40	31	6	4	1	0	5.0	1.92
30	5.8	327	72	143	143	122	77	42	31	23	14	2	2	1	0	3.6	1.44
60	3.2	605	81	127	106	41	20	16	4	0	0	0	0	0	0	1.5	0.99
90	3.3	565	91	153	97	32	32	14	5	4	4	2	0	0	2	1.7	0.92
120	6.4	304	82	149	100	69	44	32	27	18	38	32	31	25	52	4.0	0.86
150	15.1	130	60	119	142	104	85	75	59	49	78	40	35	13	9	5.8	1.40
180	6.6	283	65	138	138	106	73	58	48	38	37	9	6	1	1	4.1	1.37
210	6.3	314	47	121	142	136	91	55	44	18	18	10	4	0	1	4.0	1.49
240	6.5	289	34	105	153	139	87	52	55	35	33	13	2	2	1	4.4	1.51
270	9.1	205	39	95	140	105	85	67	64	57	72	34	18	9	9	5.5	1.37
300	11.8	157	48	97	127	124	112	96	73	63	59	23	13	6	1	5.7	1.70
330	12.1	149	71	149	176	151	110	65	47	29	29	12	7	2	1	4.6	1.59
Total	100.0	228	62	122	139	117	91	65	50	38	42	18	13	6	6	4.7	1.32

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.5	4.7	4.6	3.7	2.2	1.9	1.7	1.5	2.1	3.1	4.1	3.2	3.0
3	3.4	4.7	4.3	3.9	2.0	1.8	1.5	1.4	2.2	3.0	3.9	3.1	2.9
6	3.7	5.0	4.8	3.6	2.3	2.2	1.7	1.5	2.4	2.9	4.0	3.4	3.1
9	3.8	5.3	5.4	5.5	4.8	4.7	4.5	3.7	4.1	4.2	4.8	3.5	4.5
12	5.5	6.7	7.1	7.1	6.2	5.8	5.9	5.4	5.7	5.6	6.0	4.9	6.0
15	5.1	6.5	6.7	6.7	5.6	5.7	5.8	5.4	5.8	5.4	5.7	5.0	5.8
18	3.6	5.1	5.0	5.2	4.1	4.3	4.6	3.9	3.8	3.7	4.4	3.2	4.2
21	3.4	4.7	4.3	4.1	2.1	2.3	2.2	2.0	2.3	2.9	3.9	3.2	3.1
Day	4.0	5.3	5.3	5.0	3.7	3.6	3.5	3.1	3.6	3.8	4.6	3.7	4.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	7.2	4.4	3.3	6.2	8.6	7.5	7.1	7.8	8.2	8.5	7.5	7.5
	2.12	1.97	1.42	1.07	0.81	1.29	1.47	1.63	1.67	1.52	1.78	1.85	1.37
25	8.7	7.9	4.9	3.7	6.8	9.4	8.2	7.8	8.6	8.9	9.3	8.2	8.2
	2.18	2.03	1.47	1.10	0.81	1.30	1.49	1.66	1.70	1.54	1.81	1.90	1.38
50	9.3	8.5	5.3	4.0	7.2	10.0	8.7	8.4	9.2	9.6	9.9	8.8	8.7
	2.24	2.09	1.51	1.13	0.81	1.31	1.52	1.71	1.75	1.57	1.86	1.95	1.41
100	10.1	9.2	5.7	4.3	7.6	10.6	9.3	9.0	9.8	10.2	10.6	9.5	9.4
	2.17	2.02	1.46	1.10	0.81	1.32	1.51	1.67	1.71	1.56	1.83	1.90	1.41
200	11.1	10.1	6.2	4.6	8.0	11.3	10.0	9.8	10.6	10.9	11.4	10.4	10.2
	2.06	1.91	1.38	1.04	0.81	1.30	1.47	1.61	1.66	1.52	1.77	1.81	1.40
Freq	13.1	8.4	4.1	3.3	5.4	12.3	9.4	6.4	6.5	8.4	10.9	11.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	4.4	2.3	2.2	5.1	6.2	4.8	5.1	5.6	5.8	6.0	5.0	5.2
	1.87	1.51	1.05	0.91	0.84	1.35	1.34	1.46	1.49	1.38	1.67	1.58	1.25
25	6.8	5.3	2.8	2.8	6.0	7.3	5.8	6.1	6.6	6.8	7.1	6.0	6.2
	2.01	1.63	1.13	0.98	0.84	1.38	1.41	1.54	1.56	1.42	1.75	1.71	1.30
50	7.9	6.2	3.3	3.3	6.6	8.2	6.6	7.0	7.6	7.7	8.1	7.0	7.1
	2.25	1.83	1.26	1.08	0.85	1.42	1.51	1.67	1.66	1.48	1.88	1.90	1.37
100	9.3	7.4	4.0	4.1	7.3	9.2	7.7	8.1	8.7	8.8	9.3	8.3	8.3
	2.40	1.94	1.34	1.15	0.85	1.51	1.62	1.79	1.78	1.58	2.02	2.03	1.47
200	11.5	9.2	4.9	5.0	8.0	10.4	9.1	9.7	10.2	10.1	11.0	10.2	9.8
	2.29	1.86	1.28	1.10	0.86	1.48	1.56	1.73	1.73	1.54	1.95	1.94	1.50
Freq	13.4	6.6	3.4	3.3	6.1	14.4	7.3	6.3	6.5	9.0	11.6	12.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	3.6	1.8	2.0	4.7	5.4	4.0	4.5	4.9	5.1	5.2	4.3	4.5
	1.92	1.45	1.02	0.92	0.86	1.39	1.36	1.48	1.50	1.38	1.70	1.60	1.26
25	6.2	4.5	2.2	2.6	5.6	6.5	5.0	5.5	6.0	6.2	6.4	5.3	5.6
	2.05	1.55	1.08	0.98	0.86	1.42	1.43	1.54	1.56	1.42	1.78	1.71	1.30
50	7.2	5.3	2.7	3.1	6.3	7.5	5.8	6.4	6.9	7.1	7.4	6.3	6.5
	2.26	1.72	1.19	1.07	0.86	1.47	1.54	1.66	1.65	1.48	1.90	1.88	1.37
100	8.6	6.3	3.3	3.8	7.1	8.6	6.9	7.6	8.1	8.2	8.6	7.5	7.6
	2.49	1.88	1.30	1.17	0.87	1.56	1.69	1.82	1.80	1.58	2.08	2.07	1.47
200	10.6	7.8	4.0	4.7	7.9	9.8	8.3	9.0	9.5	9.4	10.3	9.2	9.1
	2.38	1.80	1.25	1.12	0.88	1.55	1.63	1.76	1.74	1.56	2.01	1.98	1.51
Freq	13.5	5.9	3.2	3.3	6.3	15.2	6.6	6.2	6.5	9.2	11.8	12.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	2.7	1.3	1.9	3.8	4.2	3.2	3.6	3.9	4.0	4.0	3.4	3.6
	1.88	1.42	0.97	0.82	0.91	1.42	1.37	1.49	1.49	1.43	1.69	1.62	1.27
25	5.1	3.6	1.8	2.5	4.9	5.5	4.2	4.7	5.1	5.2	5.3	4.5	4.7
	1.99	1.50	1.02	0.83	0.91	1.44	1.44	1.55	1.53	1.46	1.76	1.71	1.31
50	6.2	4.4	2.2	3.0	5.7	6.5	5.1	5.6	6.0	6.2	6.3	5.5	5.6
	2.15	1.63	1.10	0.84	0.92	1.49	1.52	1.64	1.60	1.51	1.86	1.86	1.36
100	7.4	5.4	2.8	3.5	6.6	7.6	6.1	6.7	7.1	7.3	7.5	6.6	6.7
	2.45	1.85	1.24	0.87	0.93	1.56	1.70	1.81	1.73	1.61	2.05	2.12	1.45
200	9.1	6.6	3.3	4.1	7.5	8.8	7.3	8.0	8.4	8.6	8.9	8.1	8.0
	2.36	1.78	1.20	0.89	0.94	1.60	1.67	1.79	1.74	1.63	2.03	2.04	1.49
Freq	12.8	5.5	3.2	3.6	7.6	14.1	6.5	6.3	6.9	9.4	11.9	12.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.8	613	4.8	255	4.2	166	3.3	79
25	7.4	777	5.7	393	5.1	286	4.3	168
50	8.0	922	6.5	524	5.9	405	5.2	266
100	8.5	1134	7.5	717	6.9	568	6.1	396
200	9.3	1468	8.9	1160	8.2	913	7.2	633

Unia

40° 50′ 00″ N	08° 20′ 00″ E	UTM 32	E 443788 m	N 4520548 m	40 m a.s.l.

Location in the NW part of Sardinia on the Asinara peninsula. The terrain is flat or gently rolling with cereal cultivation extending to the south coast. The area is characterized by scattered bushes and some houses or farms. Individual properties are separated by 1-m high walls. The Mediterranean Sea is 1.5 km away in the W direction and 4 km away in E direction. Between the station and the sea - in the sectors SW to NW - there are small hills of 90–100 m height.
The anemometer is situated 2 m from a transformer building which measures 5 × 5 × 10 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05												
30	0.05	3500	0.00										
60	0.05	3500	0.00										
90	0.05	4000	0.00										
120	0.05												
150	0.05												
180	0.05												
210	0.10												
240	0.10	2500	0.00										
270	0.05	1500	0.00										
300	0.05	1500	0.00										
330	0.05	2500	0.00										

Height of anemometer: 15.0 m a.g.l. Period: 79121818–85101221

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.3	203	191	180	114	99	50	40	23	19	40	26	11	4	0	3.5	1.10
30	4.4	124	150	219	198	132	70	39	19	16	19	12	0	0	0	3.8	1.53
60	9.3	70	101	146	171	119	94	77	73	52	60	28	9	1	1	5.2	1.59
90	7.7	85	126	143	113	89	100	103	71	62	65	27	16	0	0	5.6	1.72
120	5.1	157	299	223	148	72	55	20	10	4	6	4	1	0	0	2.8	1.38
150	5.0	129	248	292	184	65	35	26	7	3	12	0	0	0	0	3.0	1.57
180	1.7	184	224	348	179	37	10	5	0	0	9	5	0	0	0	2.8	1.61
210	4.9	122	118	189	224	78	58	48	52	41	35	29	4	2	0	3.8	1.19
240	11.8	42	59	105	137	160	125	110	97	69	69	19	7	2	1	6.0	2.01
270	15.3	48	60	105	134	163	144	126	81	59	50	20	6	4	0	5.9	2.05
300	21.8	37	50	82	108	126	103	96	75	76	119	68	37	16	7	7.3	1.81
330	8.8	105	118	132	84	72	65	77	73	51	76	72	32	26	16	6.6	1.46
Total	100.0	80	109	141	137	117	94	83	64	52	64	35	15	7	3	5.5	1.50

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.1	4.6	4.8	4.4	3.6	3.5	2.9	3.3	3.4	4.4	5.2	6.0	4.3
3	6.4	4.8	5.3	4.4	3.3	3.4	2.9	3.9	3.4	4.3	5.0	5.8	4.4
6	6.2	4.8	5.2	4.7	3.8	4.2	3.1	4.1	3.4	4.1	5.1	5.4	4.5
9	6.9	5.0	5.8	5.8	4.9	5.6	4.9	5.1	4.7	5.1	5.5	6.1	5.4
12	7.1	5.7	6.5	6.1	5.6	6.3	6.0	5.6	5.7	6.1	6.0	7.0	6.1
15	6.8	5.7	6.3	5.8	5.2	5.6	5.6	5.3	5.6	5.4	5.1	6.4	5.7
18	6.3	4.8	5.4	5.1	3.9	3.7	3.5	4.0	3.9	4.3	4.9	6.4	4.7
21	5.8	4.7	4.9	4.5	3.5	3.3	2.5	3.3	3.4	4.1	5.3	6.3	4.3
Day	6.4	5.0	5.5	5.1	4.2	4.4	3.9	4.3	4.2	4.7	5.3	6.2	4.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.5	6.1	6.6	4.4	4.1	4.0	6.0	7.4	6.8	8.2	7.9	6.6
	1.26	1.38	1.53	1.66	1.48	1.77	1.81	1.39	1.92	2.01	1.77	1.54	1.56
25	6.1	4.9	6.7	7.3	4.9	4.5	4.3	6.5	8.1	7.5	8.9	8.7	7.3
	1.29	1.42	1.58	1.71	1.52	1.83	1.87	1.42	1.98	2.07	1.81	1.56	1.59
50	6.6	5.3	7.2	7.8	5.3	4.9	4.7	7.0	8.7	8.0	9.6	9.3	7.8
	1.32	1.46	1.62	1.76	1.56	1.88	1.92	1.46	2.04	2.12	1.86	1.60	1.63
100	7.0	5.8	7.8	8.5	5.7	5.3	5.1	7.6	9.4	8.7	10.3	9.9	8.4
	1.29	1.41	1.56	1.70	1.51	1.82	1.86	1.43	1.97	2.06	1.81	1.58	1.60
200	7.6	6.3	8.6	9.3	6.2	5.8	5.6	8.2	10.4	9.6	11.2	10.7	9.2
	1.25	1.34	1.49	1.61	1.44	1.73	1.76	1.37	1.87	1.95	1.74	1.53	1.54
Freq	4.9	4.4	8.6	7.9	5.4	5.0	2.2	4.4	10.8	14.8	20.9	10.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.2	4.3	4.4	2.8	2.9	2.9	4.5	5.1	4.8	5.9	5.3	4.6
	1.10	1.23	1.33	1.36	1.36	1.53	1.23	1.36	1.65	1.62	1.56	1.28	1.37
25	4.1	3.9	5.2	5.3	3.3	3.5	3.5	5.4	6.1	5.8	6.9	6.3	5.5
	1.17	1.32	1.43	1.46	1.47	1.65	1.32	1.44	1.78	1.74	1.64	1.33	1.45
50	4.8	4.6	6.1	6.2	3.9	4.1	4.1	6.3	7.1	6.7	7.9	7.2	6.4
	1.28	1.48	1.60	1.64	1.65	1.85	1.48	1.58	2.00	1.96	1.77	1.40	1.58
100	5.8	5.5	7.3	7.4	4.7	4.8	4.9	7.4	8.4	7.9	9.2	8.2	7.6
	1.37	1.58	1.71	1.74	1.75	1.98	1.57	1.69	2.13	2.08	1.90	1.50	1.69
200	7.0	6.8	9.0	9.2	5.8	6.0	6.1	9.0	10.5	9.9	10.9	9.5	9.2
	1.31	1.51	1.63	1.67	1.67	1.88	1.50	1.63	2.04	1.99	1.83	1.46	1.65
Freq	4.3	4.9	9.1	7.4	5.1	4.7	2.0	5.6	12.2	15.9	20.5	8.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	2.9	3.8	3.7	2.5	2.6	2.7	4.1	4.4	4.2	5.1	4.5	4.0
	1.11	1.19	1.34	1.31	1.40	1.56	1.19	1.44	1.65	1.56	1.56	1.26	1.37
25	3.7	3.6	4.7	4.6	3.1	3.2	3.4	5.1	5.4	5.2	6.3	5.5	5.0
	1.18	1.27	1.43	1.40	1.49	1.66	1.27	1.52	1.77	1.66	1.62	1.30	1.44
50	4.4	4.3	5.6	5.5	3.6	3.8	4.1	6.0	6.4	6.2	7.3	6.4	5.8
	1.29	1.40	1.58	1.55	1.65	1.84	1.40	1.67	1.96	1.84	1.73	1.36	1.55
100	5.3	5.2	6.7	6.6	4.3	4.5	4.9	7.1	7.6	7.4	8.5	7.5	6.9
	1.41	1.53	1.73	1.70	1.81	2.02	1.53	1.83	2.15	2.02	1.90	1.48	1.70
200	6.5	6.4	8.2	8.1	5.3	5.5	6.0	8.7	9.4	9.1	10.0	8.7	8.4
	1.36	1.47	1.66	1.63	1.73	1.93	1.47	1.76	2.06	1.93	1.83	1.44	1.66
Freq	4.3	5.3	9.0	7.2	5.1	4.3	2.3	6.2	12.6	16.4	19.4	7.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.5	3.0	2.7	1.9	2.0	2.3	3.4	3.4	3.4	4.0	3.5	3.1
	1.16	1.25	1.35	1.26	1.40	1.48	1.17	1.55	1.66	1.52	1.55	1.23	1.37
25	3.2	3.3	4.0	3.7	2.6	2.6	3.1	4.5	4.5	4.5	5.2	4.5	4.2
	1.22	1.32	1.42	1.33	1.49	1.56	1.24	1.64	1.76	1.62	1.61	1.26	1.43
50	3.9	4.0	4.8	4.5	3.1	3.2	3.8	5.4	5.4	5.5	6.3	5.4	5.0
	1.32	1.43	1.54	1.44	1.61	1.69	1.34	1.77	1.91	1.75	1.69	1.31	1.53
100	4.8	4.9	5.9	5.5	3.8	3.8	4.6	6.5	6.6	6.6	7.5	6.4	6.1
	1.50	1.63	1.75	1.63	1.83	1.93	1.52	2.01	2.18	1.99	1.86	1.41	1.70
200	5.8	5.9	7.2	6.7	4.6	4.7	5.6	7.9	8.0	8.1	8.9	7.5	7.4
	1.45	1.57	1.69	1.57	1.77	1.86	1.47	1.94	2.10	1.92	1.85	1.42	1.68
Freq	4.3	5.9	8.8	6.9	5.1	3.9	2.7	7.0	13.0	17.2	17.8	7.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	337	4.2	143	3.7	94	2.9	45
25	6.5	426	5.0	220	4.5	162	3.8	96
50	7.0	507	5.7	293	5.2	228	4.5	151
100	7.6	657	6.7	432	6.2	333	5.4	227
200	8.3	910	8.2	812	7.5	618	6.6	408

Uras

39° 42′ 00″ N 08° 42′ 00″ E	UTM 32 E 474279 m N 4394579 m	30 m a.s.l.

Location in the SW part of Sardinia, 19 km E of the coast and 2-4 km from the mountains in the N-E sector in the NW part of the Campidano valley. The terrain is open and flat around the mast. The anemometer mast is situated in the vicinity of a local transformer station, 6 m due south of a N-S oriented building with approximate dimensions 15 × 30 × 4 m. To the N and S, from 100 m, there are rows of trees running W-E. The transformer station is enclosed by a 3-m high wall and the structures of the transformer station are found 20 m away in the N-E sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05												
30	0.03	2000	0.40										
60	0.03	2000	0.40										
90	0.03	2000	0.40										
120	0.15												
150	0.15												
180	0.15												
210	0.15												
240	0.05	2000	0.20										
270	0.15												
300	0.07												
330	0.05												

Height of anemometer: 15.0 m a.g.l. Period: 79121712-81012706

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.5	162	165	251	170	96	31	57	10	17	33	8	0	0	0	3.3	1.30
30	4.1	385	391	182	31	6	0	0	0	0	6	0	0	0	0	1.7	1.37
60	3.2	540	350	60	22	11	0	11	7	0	0	0	0	0	0	1.3	1.06
90	6.9	329	242	120	55	24	15	38	39	35	27	49	18	8	0	2.6	0.81
120	17.0	173	207	107	92	62	73	80	70	31	63	26	8	6	0	4.5	1.31
150	7.9	226	234	126	110	75	59	55	39	49	26	0	0	0	0	3.4	1.26
180	0.7	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	10.34
210	0.8	498	139	133	139	45	46	0	0	0	0	0	0	0	0	1.9	1.22
240	2.1	312	177	27	119	99	48	32	128	16	16	27	0	0	0	3.9	1.31
270	4.3	171	114	168	151	163	122	43	8	25	26	0	9	0	0	4.2	1.66
300	24.8	53	73	93	135	161	142	112	54	56	72	38	11	1	0	5.9	1.85
330	18.8	97	140	173	166	119	74	75	32	24	67	21	9	1	1	4.5	1.36
Total	100.0	175	167	134	121	100	77	71	41	33	50	23	7	2	0	4.3	1.33

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.9	3.4	3.0	4.3	2.0	2.7	1.6	2.5	2.5	2.6	2.8	4.5	3.0
3	4.1	3.2	2.6	3.8	2.1	2.4	1.6	2.5	2.0	2.7	3.5	4.3	2.9
6	4.2	3.5	2.7	4.4	2.0	2.3	1.8	2.3	1.4	2.6	3.1	4.8	3.0
9	4.8	3.0	4.2	5.4	3.8	4.4	4.1	4.3	3.4	4.2	3.2	5.3	4.3
12	6.2	4.3	5.5	6.4	5.2	5.5	5.7	6.0	4.7	5.2	3.8	6.8	5.5
15	5.8	4.9	5.8	6.8	5.7	5.2	5.6	6.1	5.7	5.4	3.7	6.6	5.7
18	3.9	3.3	3.3	5.1	4.0	4.5	4.5	5.1	3.7	3.4	3.0	4.9	4.1
21	3.8	3.0	3.0	4.2	2.9	2.6	2.2	2.9	2.4	3.0	3.2	4.3	3.2
Day	4.6	3.6	3.8	5.0	3.4	3.7	3.4	4.0	3.2	3.6	3.3	5.2	4.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	3.6	2.2	3.0	6.8	6.1	4.3	1.8	5.6	6.6	8.5	7.3	6.2
	1.49	1.35	1.37	0.78	1.34	1.37	1.24	1.00	1.47	1.83	2.08	1.79	1.42
25	6.0	4.0	2.4	3.3	7.4	6.6	4.7	2.0	6.1	7.2	9.3	8.0	6.8
	1.54	1.40	1.41	0.78	1.36	1.40	1.28	1.03	1.52	1.89	2.13	1.84	1.45
50	6.4	4.3	2.6	3.5	7.9	7.1	5.1	2.2	6.6	7.7	9.9	8.6	7.3
	1.58	1.43	1.45	0.79	1.39	1.44	1.31	1.06	1.56	1.94	2.19	1.89	1.48
100	6.9	4.7	2.8	3.8	8.5	7.6	5.5	2.3	7.1	8.4	10.7	9.3	7.9
	1.52	1.39	1.40	0.79	1.38	1.41	1.27	1.02	1.51	1.88	2.13	1.84	1.46
200	7.6	5.1	3.0	4.0	9.1	8.3	6.0	2.5	7.8	9.2	11.7	10.2	8.6
	1.45	1.32	1.33	0.78	1.34	1.36	1.21	0.98	1.43	1.78	2.05	1.76	1.42
Freq	12.8	6.0	3.5	5.5	13.3	11.3	3.5	0.8	1.6	3.5	17.6	20.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	1.9	1.3	2.5	5.0	3.9	1.9	1.8	3.9	4.6	6.0	4.6	4.3
	1.26	1.10	1.07	0.78	1.28	1.21	0.84	1.08	1.26	1.59	1.81	1.40	1.26
25	4.1	2.3	1.6	2.9	5.9	4.7	2.3	2.2	4.7	5.5	7.1	5.5	5.1
	1.36	1.19	1.15	0.80	1.33	1.29	0.90	1.16	1.35	1.71	1.92	1.49	1.33
50	4.9	2.8	2.0	3.3	6.7	5.5	2.8	2.6	5.6	6.4	8.1	6.4	6.0
	1.52	1.33	1.28	0.82	1.41	1.43	0.99	1.29	1.51	1.92	2.10	1.65	1.43
100	5.8	3.3	2.3	3.9	7.7	6.5	3.4	3.1	6.7	7.6	9.5	7.6	7.0
	1.62	1.41	1.36	0.87	1.51	1.52	1.05	1.37	1.61	2.05	2.25	1.77	1.53
200	7.2	4.1	2.9	4.3	9.0	7.9	4.2	3.8	8.2	9.4	11.4	9.3	8.5
	1.54	1.35	1.30	0.85	1.46	1.46	1.01	1.31	1.54	1.96	2.16	1.69	1.49
Freq	10.5	4.7	3.3	6.5	15.7	9.0	1.6	0.8	2.0	4.0	22.6	19.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	1.6	1.1	2.3	4.3	3.2	0.5	1.7	3.5	4.0	5.2	3.9	3.7
	1.30	1.27	1.04	0.80	1.29	1.22	0.55	1.16	1.28	1.60	1.82	1.37	1.27
25	3.6	2.0	1.4	2.8	5.3	4.1	0.6	2.2	4.3	4.9	6.4	4.8	4.6
	1.39	1.36	1.11	0.81	1.33	1.30	0.58	1.23	1.37	1.71	1.92	1.45	1.33
50	4.3	2.3	1.7	3.2	6.2	4.8	0.8	2.6	5.2	5.8	7.4	5.7	5.4
	1.53	1.49	1.22	0.83	1.40	1.44	0.62	1.36	1.51	1.90	2.08	1.59	1.41
100	5.2	2.8	2.1	3.7	7.2	5.8	1.0	3.1	6.2	6.9	8.7	6.8	6.5
	1.68	1.64	1.33	0.87	1.52	1.58	0.67	1.49	1.65	2.08	2.28	1.74	1.53
200	6.4	3.4	2.6	4.2	8.3	7.2	1.2	3.8	7.6	8.6	10.5	8.3	7.8
	1.61	1.57	1.27	0.87	1.48	1.51	0.65	1.43	1.58	1.99	2.20	1.67	1.50
Freq	9.7	4.2	3.2	6.8	16.6	8.2	0.9	0.8	2.1	4.2	24.4	19.0	100.0

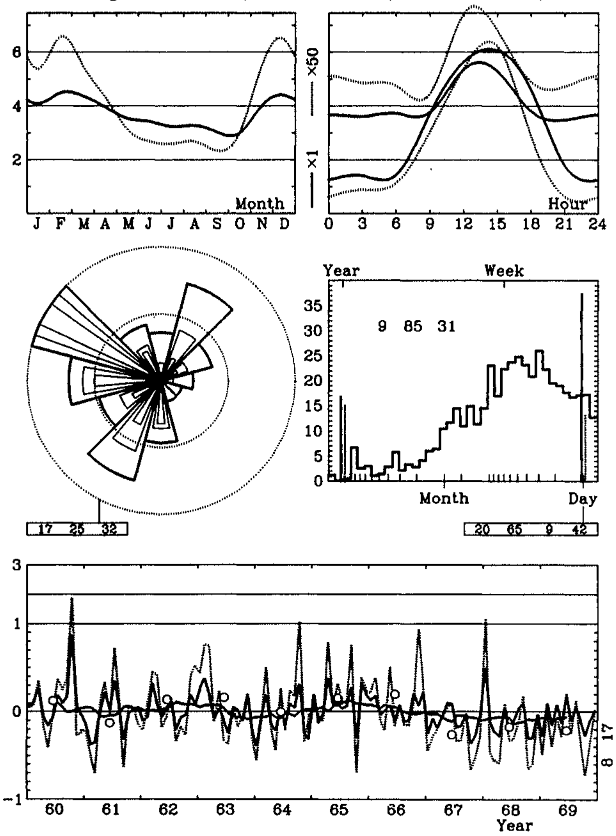
Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	1.1	1.0	2.2	3.4	2.5	0.7	1.6	2.8	3.5	4.0	3.0	3.0
	1.25	1.29	0.76	0.90	1.30	1.24	1.17	1.10	1.31	1.68	1.80	1.34	1.28
25	2.9	1.5	1.3	2.8	4.5	3.4	0.9	2.2	3.7	4.6	5.3	3.9	3.9
	1.33	1.37	0.80	0.92	1.34	1.31	1.24	1.15	1.39	1.78	1.88	1.41	1.33
50	3.5	1.9	1.6	3.4	5.3	4.2	1.1	2.7	4.5	5.6	6.3	4.8	4.7
	1.44	1.48	0.86	0.95	1.40	1.42	1.34	1.25	1.51	1.93	2.01	1.52	1.41
100	4.3	2.3	2.1	4.1	6.3	5.1	1.4	3.3	5.5	6.7	7.6	5.8	5.7
	1.63	1.68	0.96	0.99	1.50	1.62	1.52	1.42	1.71	2.20	2.26	1.72	1.54
200	5.3	2.8	2.5	4.7	7.5	6.2	1.7	4.1	6.8	8.2	9.1	7.0	6.9
	1.57	1.62	0.93	1.01	1.51	1.56	1.46	1.37	1.65	2.12	2.20	1.66	1.53
Freq	8.9	4.0	3.6	7.8	16.1	7.2	0.7	0.9	2.3	6.4	24.3	17.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.7	328	4.0	140	3.5	92	2.8	44
25	6.2	414	4.7	215	4.3	157	3.6	94
50	6.6	490	5.4	285	5.0	222	4.3	147
100	7.1	629	6.3	409	5.8	319	5.2	219
200	7.8	863	7.6	749	7.0	574	6.2	383

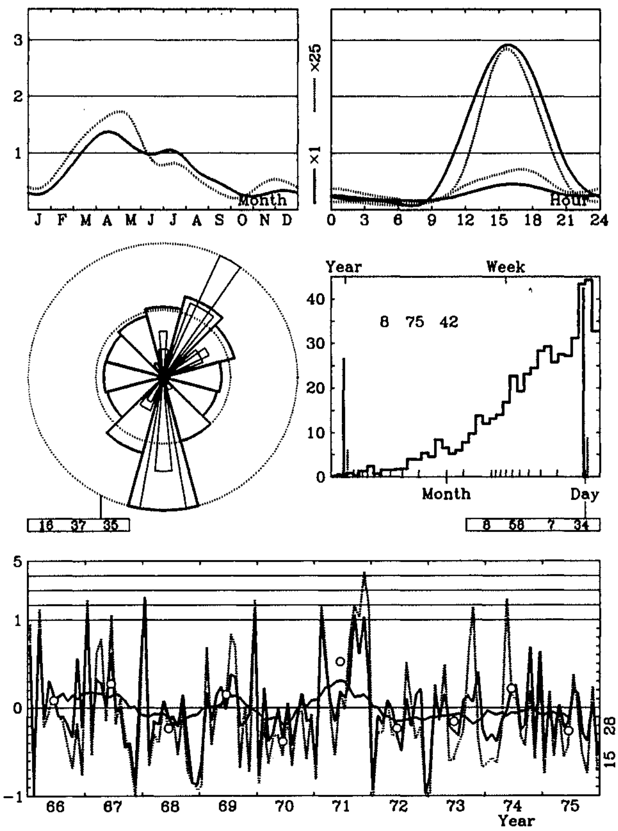
Alghero, Italy 1960–69

10.0 m agl, mean 3.7 m/s, st dev 3.4 m/s, cube 208. m^3/s^3



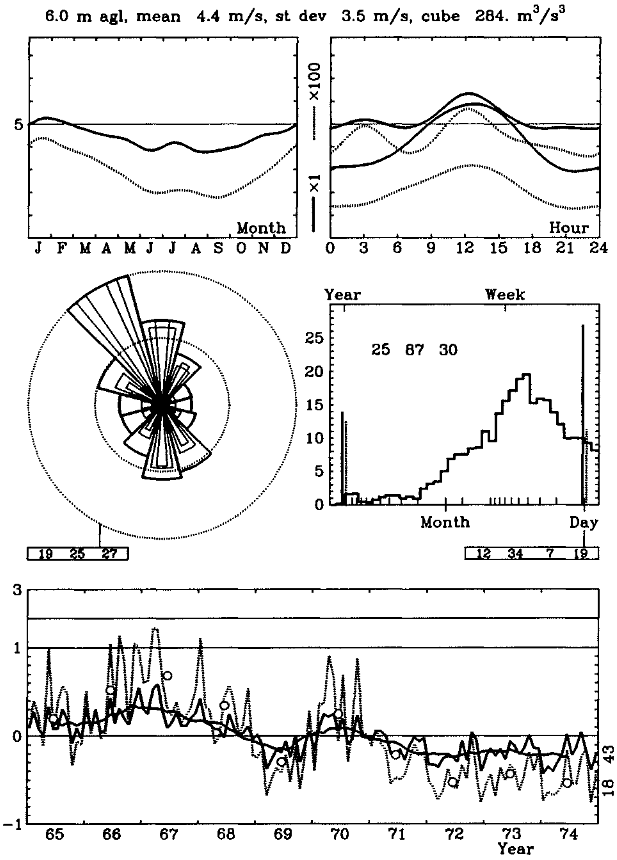
Bolzano, Italy 1966–75

6.0 m agl, mean 0.7 m/s, st dev 1.7 m/s, cube 20. m^3/s^3



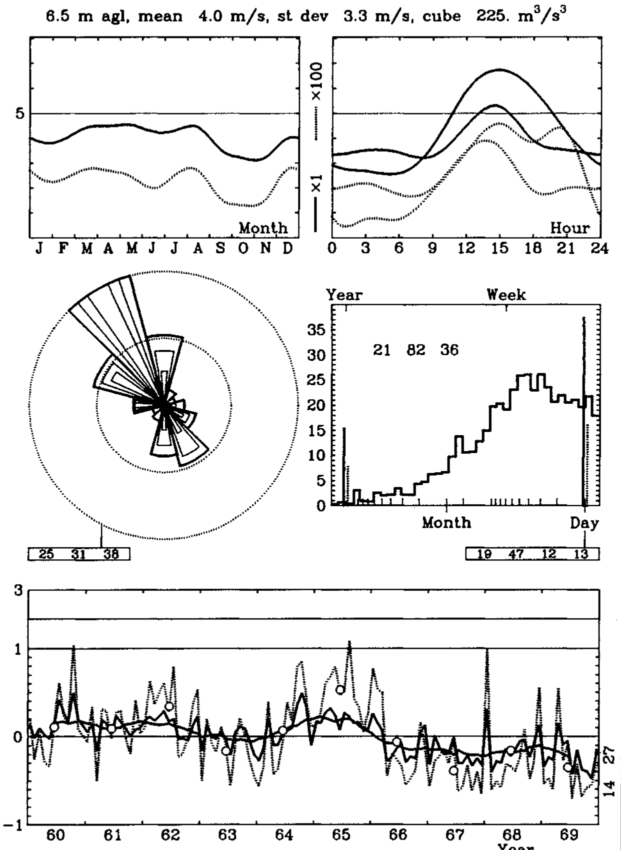
Brindisi, Italy 1965–74

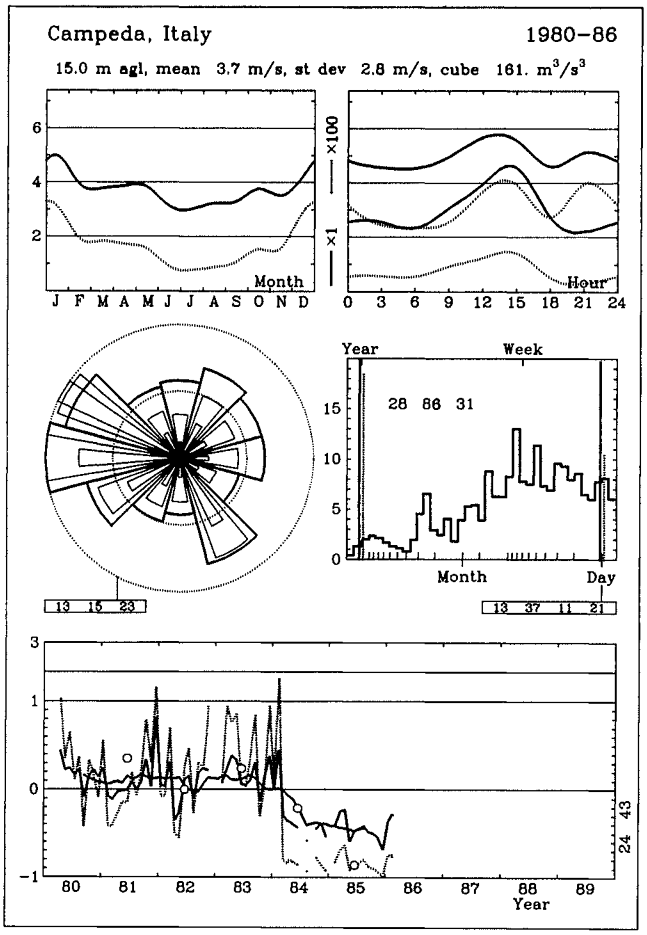
6.0 m agl, mean 4.4 m/s, st dev 3.5 m/s, cube 284. m^3/s^3

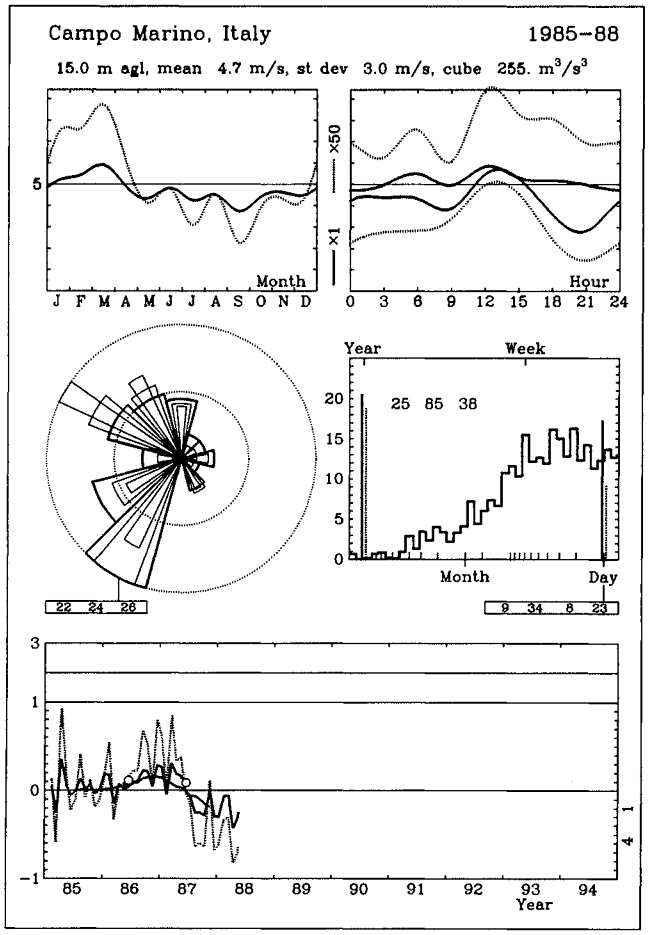


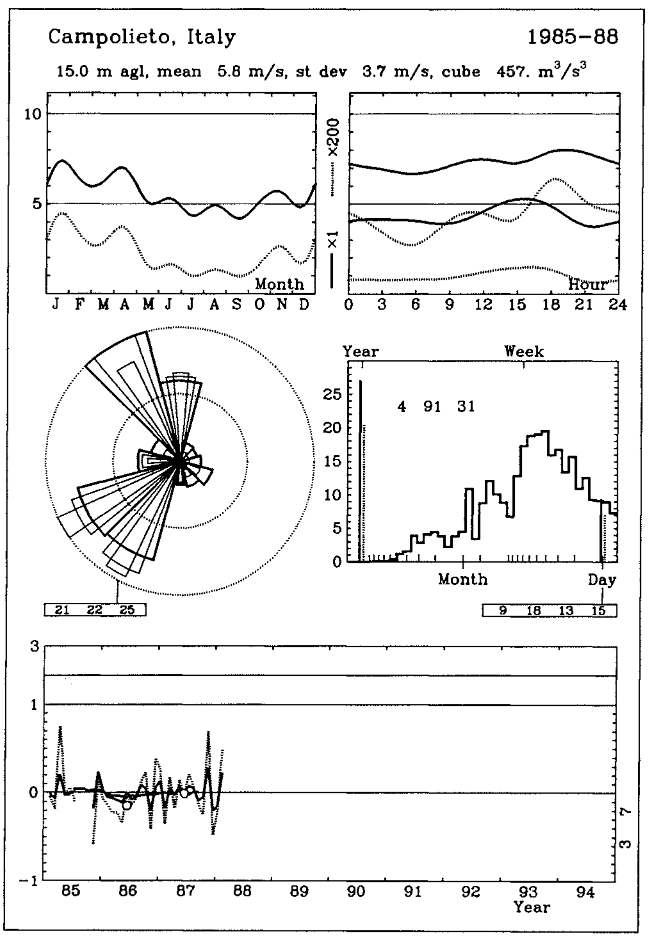
Cagliari, Italy 1960–69

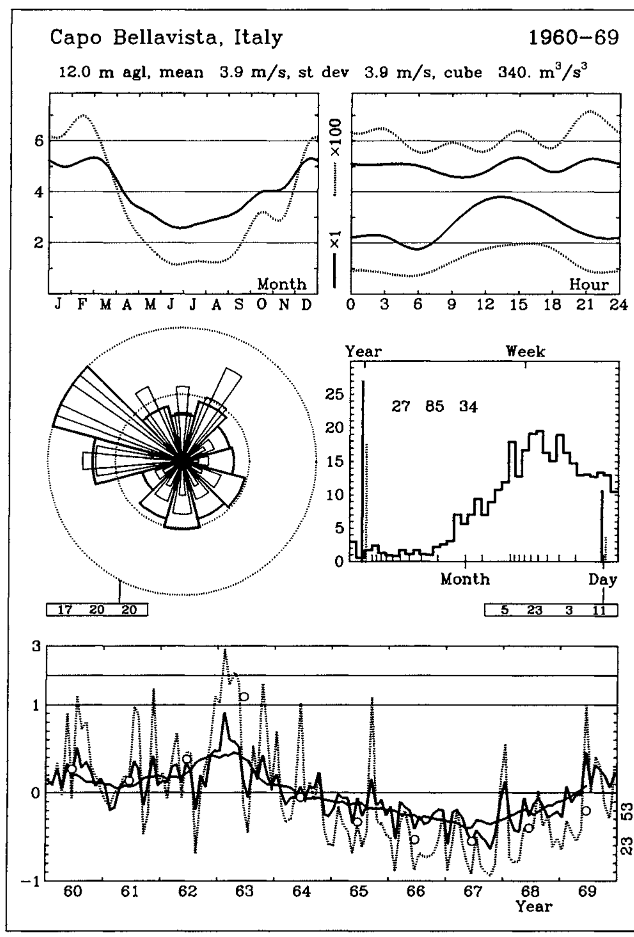
6.5 m agl, mean 4.0 m/s, st dev 3.3 m/s, cube 225. m^3/s^3




Campeda, Italy
1980–86
15.0 m agl, mean 3.7 m/s, st dev 2.8 m/s, cube 161. m^3/s^3
×100
×1
Month
Hour
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
28 86 31
Month
Day
13 15 23
13 37 11 21
24 43
80 81 82 83 84 85 86 87 88 89
Year

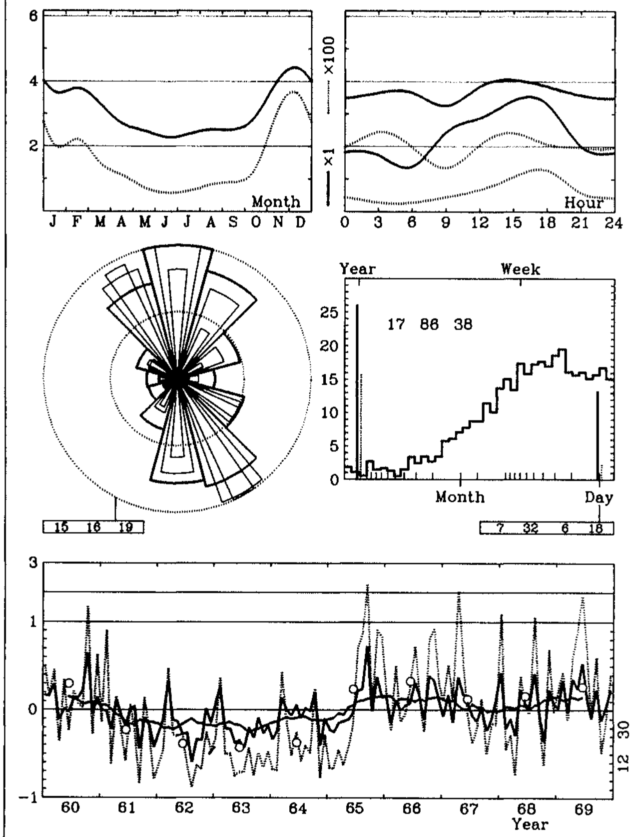

Campo Marino, Italy
1985–88
15.0 m agl, mean 4.7 m/s, st dev 3.0 m/s, cube 255. m^3/s^3
×50
×1
Month
Hour
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
25 85 38
Month
Day
22 24 28
9 34 8 23
4 1
85 86 87 88 89 90 91 92 93 94
Year


Campolieto, Italy
1985–88
15.0 m agl, mean 5.8 m/s, st dev 3.7 m/s, cube 457. m^3/s^3
×200
×1
Month
Hour
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
4 91 31
Month
Day
21 22 25
9 18 13 15
3 7
85 86 87 88 89 90 91 92 93 94
Year


Capo Bellavista, Italy
1960–69
12.0 m agl, mean 3.9 m/s, st dev 3.9 m/s, cube 340. m^3/s^3
×100
×1
Month
Hour
J F M A M J J A S O N D
0 3 6 9 12 15 18 21 24
Year
Week
27 85 34
Month
Day
17 20 20
5 23 3 11
23 53
60 61 62 63 64 65 66 67 68 69
Year

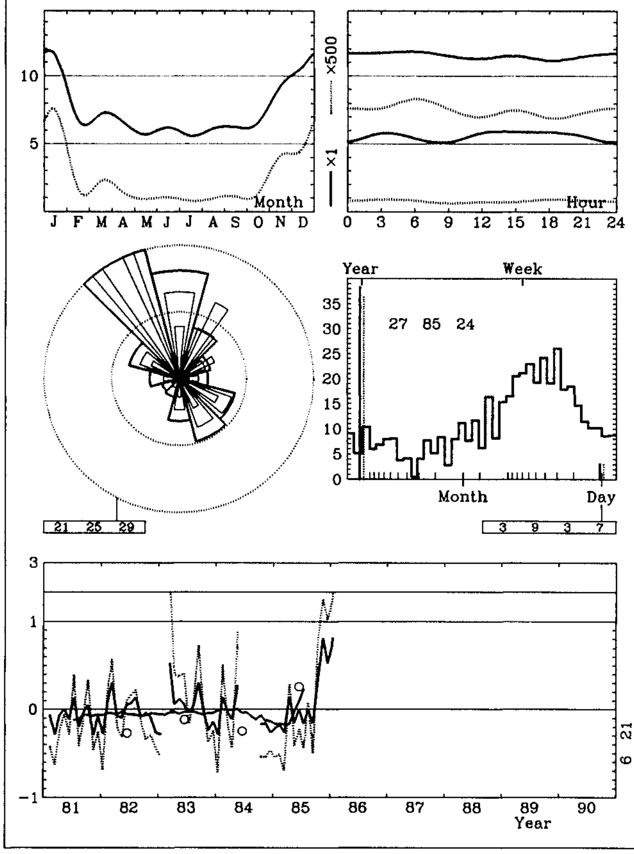
Capo Palinuro, Italy 1960–69

24.0 m agl, mean 3.1 m/s, st dev 3.0 m/s, cube 154. m^3/s^3



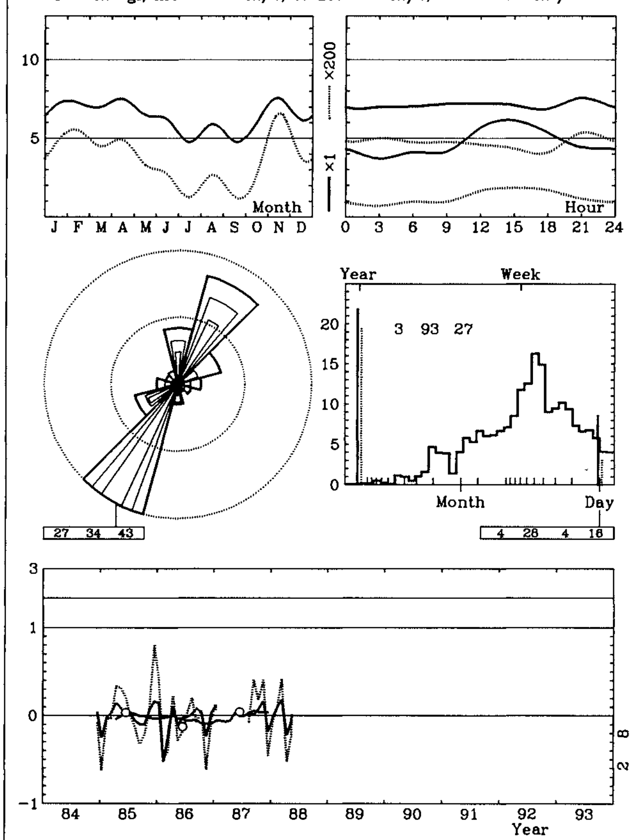
Capo Sandalo, Italy 1981–86

15.0 m agl, mean 7.4 m/s, st dev 5.2 m/s, cube 1167. m^3/s^3



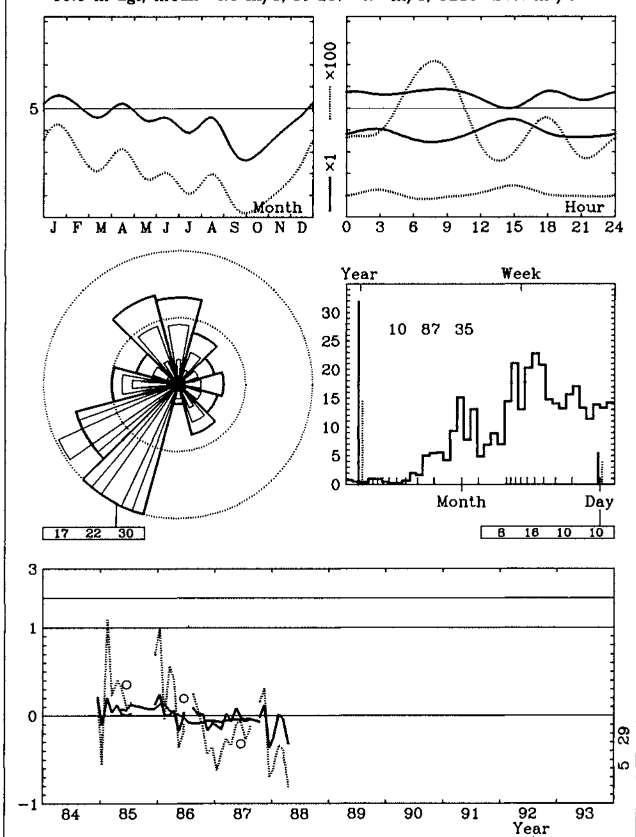
Capracotta, Italy 1984–88

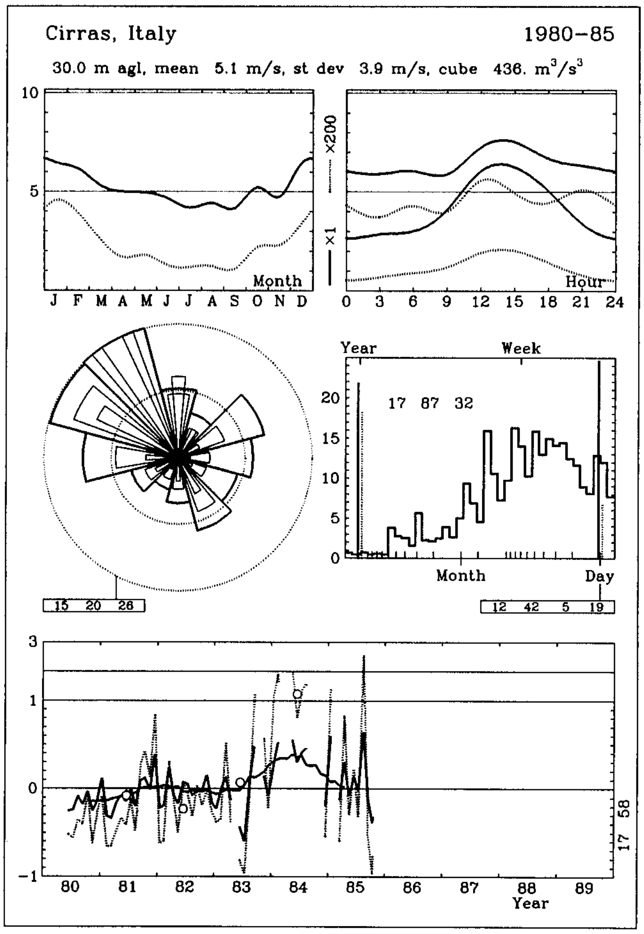
15.0 m agl, mean 6.4 m/s, st dev 4.4 m/s, cube 727. m^3/s^3



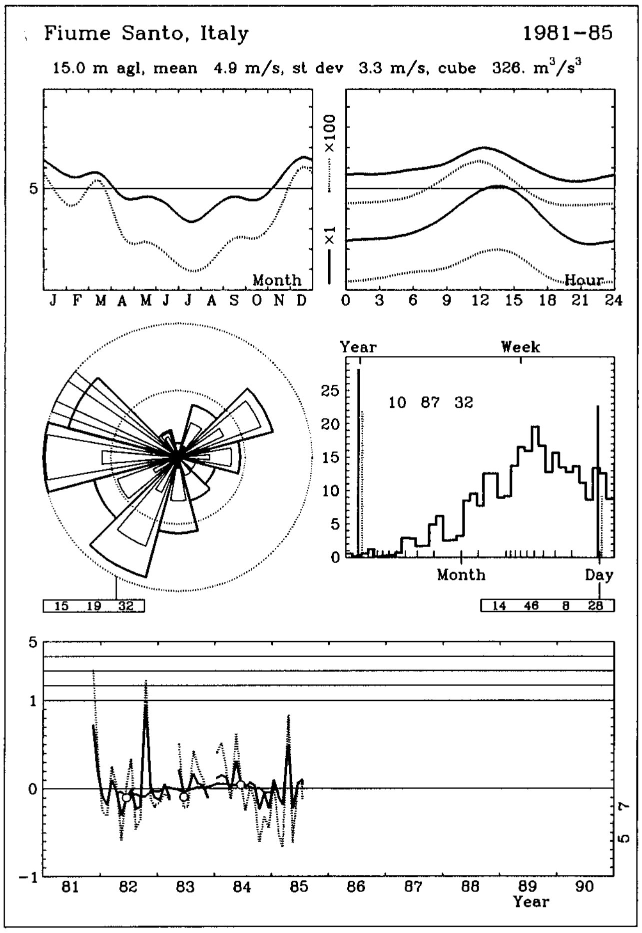
Cingoli, Italy 1984–88

15.0 m agl, mean 4.6 m/s, st dev 2.7 m/s, cube 229. m^3/s^3

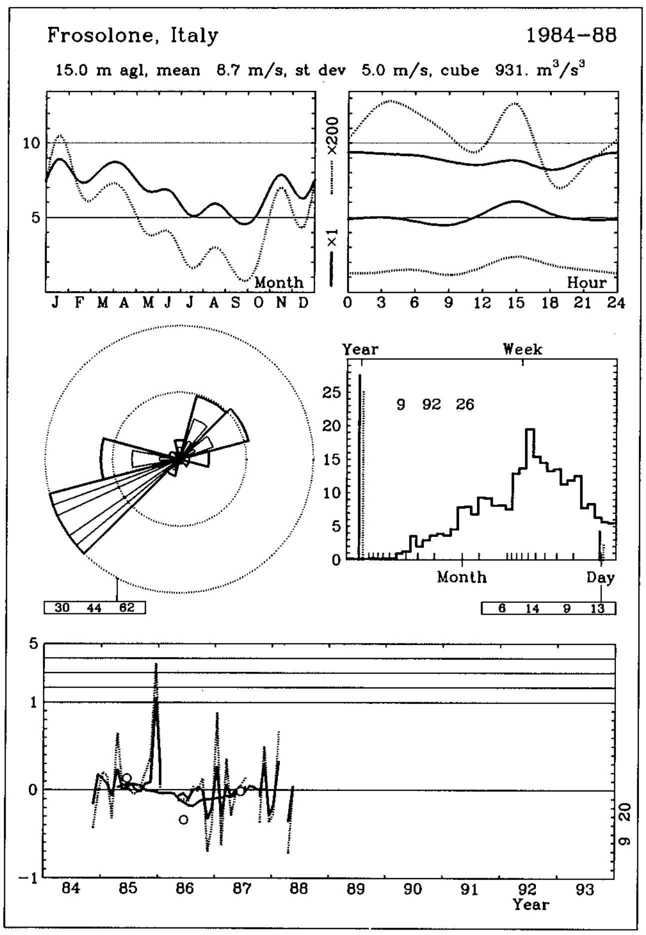




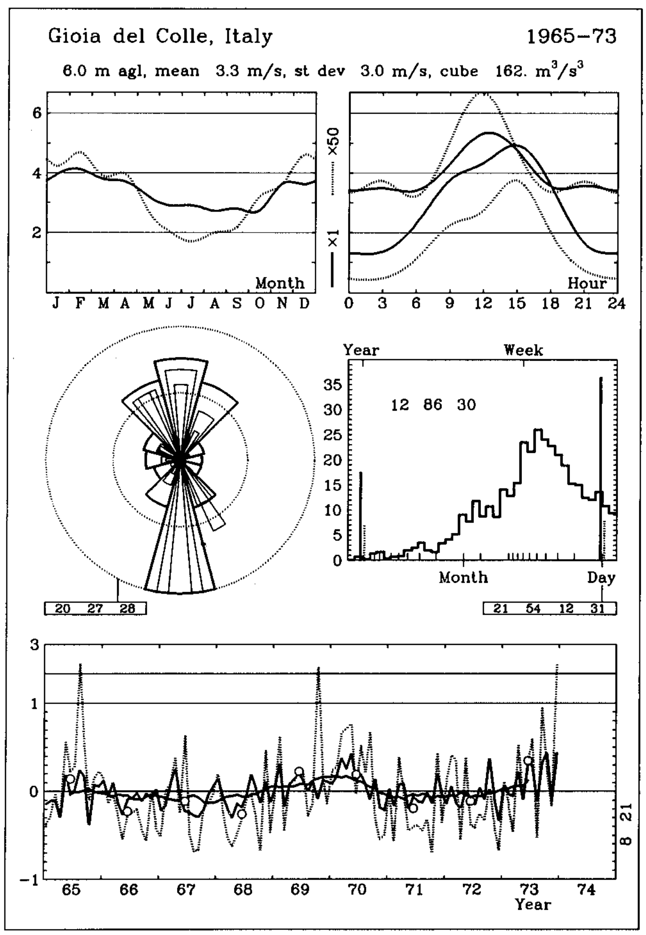
Cirras, Italy
1980–85
30.0 m agl, mean 5.1 m/s, st dev 3.9 m/s, cube 436. m³/s³
Month
Hour
×200
×1
Year
Week
17 87 32
Month
Day
15 20 26
12 42 5 19
17 58
Year



Fiume Santo, Italy
1981–85
15.0 m agl, mean 4.9 m/s, st dev 3.3 m/s, cube 326. m³/s³
Month
Hour
×100
×1
Year
Week
10 87 32
Month
Day
15 19 32
14 46 8 28
5 7
Year



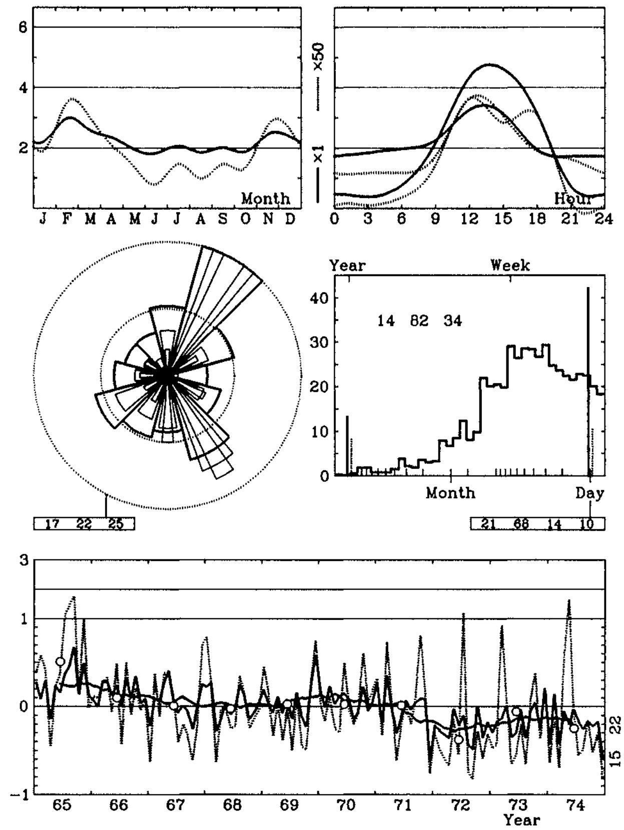
Frosolone, Italy
1984–88
15.0 m agl, mean 8.7 m/s, st dev 5.0 m/s, cube 931. m³/s³
Month
Hour
×200
×1
Year
Week
9 92 26
Month
Day
30 44 62
6 14 9 13
9 20
Year



Gioia del Colle, Italy
1965–73
6.0 m agl, mean 3.3 m/s, st dev 3.0 m/s, cube 162. m³/s³
Month
Hour
×50
×1
Year
Week
12 86 30
Month
Day
20 27 28
21 54 12 31
8 21
Year

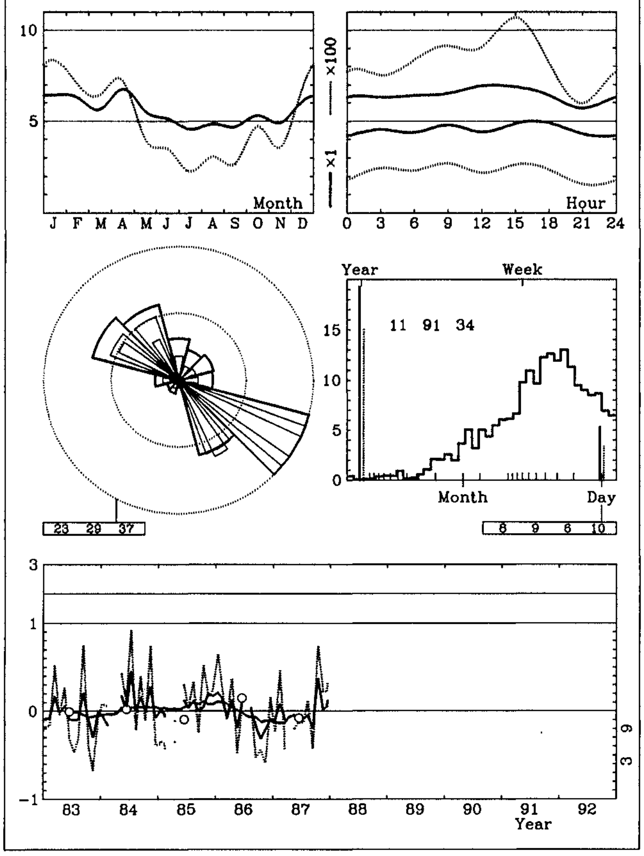
Grosseto, Italy 1965–74

6.0 m agl, mean 2.2 m/s, st dev 2.8 m/s, cube 97. m^3/s^3



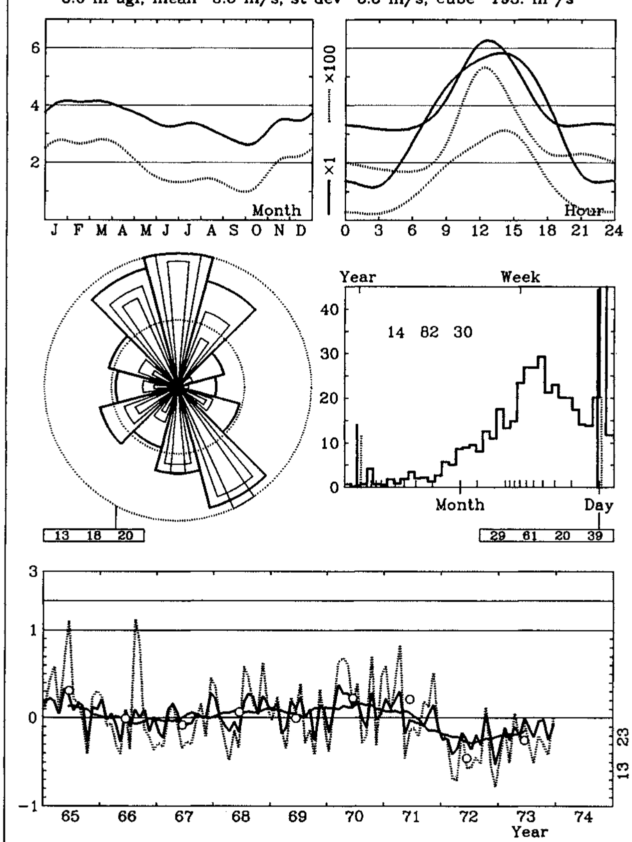
Le Porte, Italy 1983–87

15.0 m agl, mean 5.5 m/s, st dev 3.9 m/s, cube 495. m^3/s^3



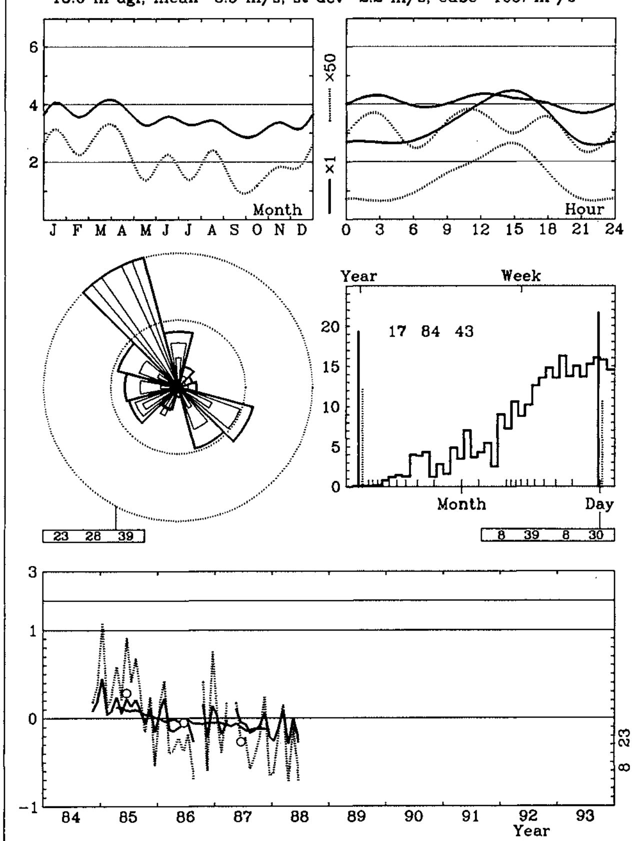
Lecce Galatina, Italy 1965–73

6.0 m agl, mean 3.5 m/s, st dev 3.3 m/s, cube 193. m^3/s^3



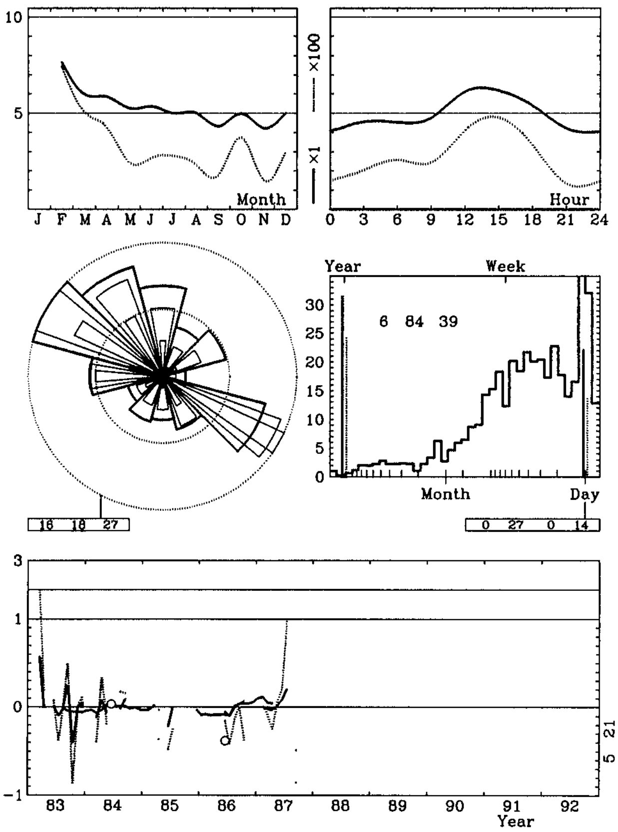
Macerata, Italy 1984–88

15.0 m agl, mean 3.5 m/s, st dev 2.2 m/s, cube 105. m^3/s^3



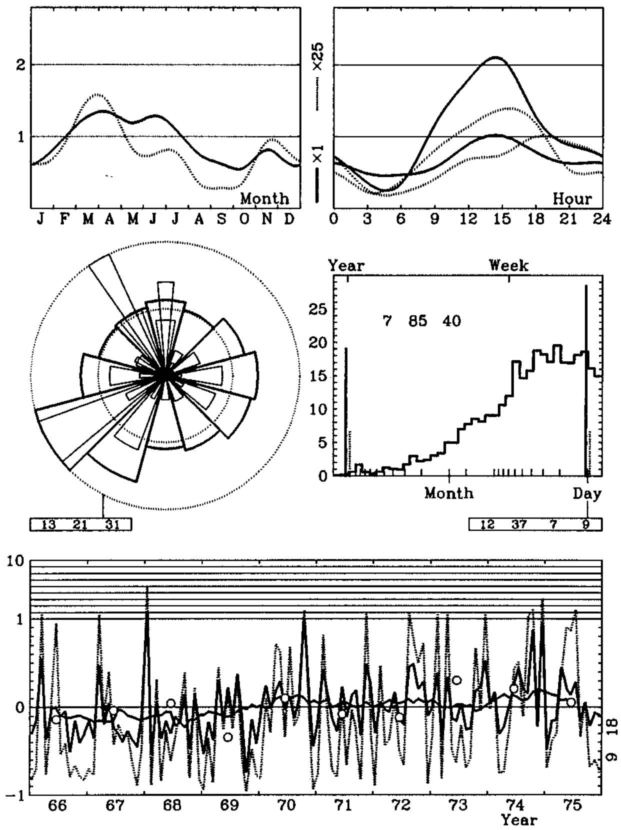
Mazara, Italy 1983–87

15.0 m agl, mean 5.2 m/s, st dev 3.0 m/s, cube 313. m^3/s^3



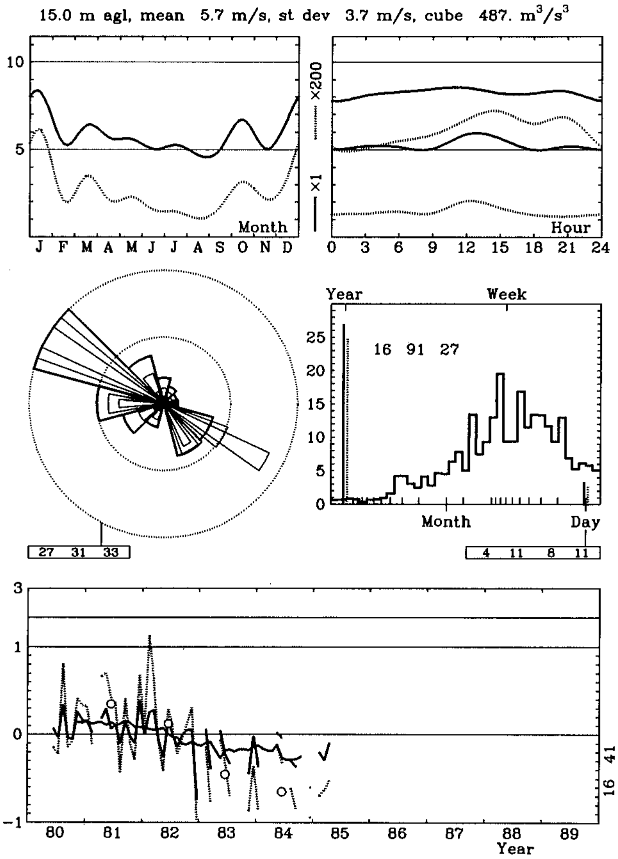
Milano, Italy 1966–75

10.0 m agl, mean 0.9 m/s, st dev 1.6 m/s, cube 20. m^3/s^3



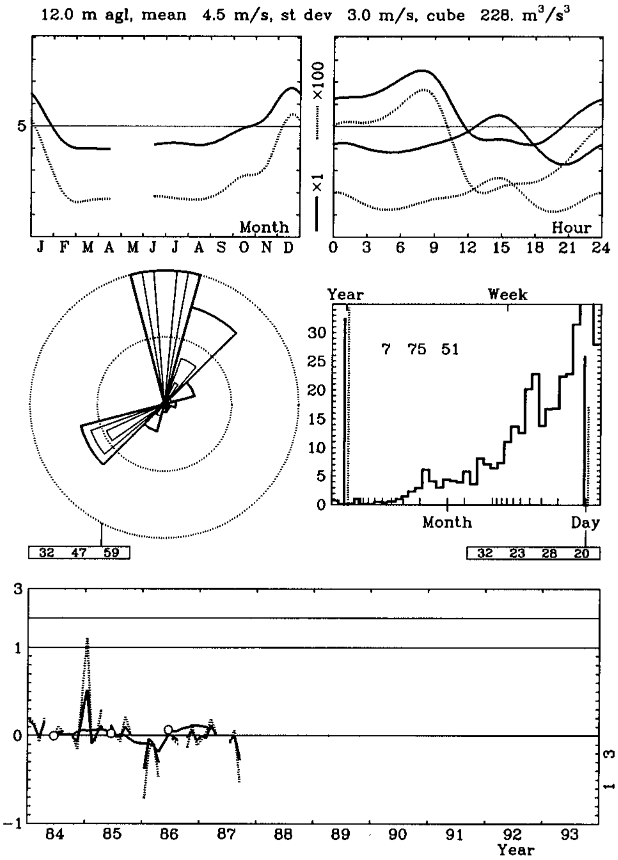
Monte Arci, Italy 1980–85

15.0 m agl, mean 5.7 m/s, st dev 3.7 m/s, cube 487. m^3/s^3



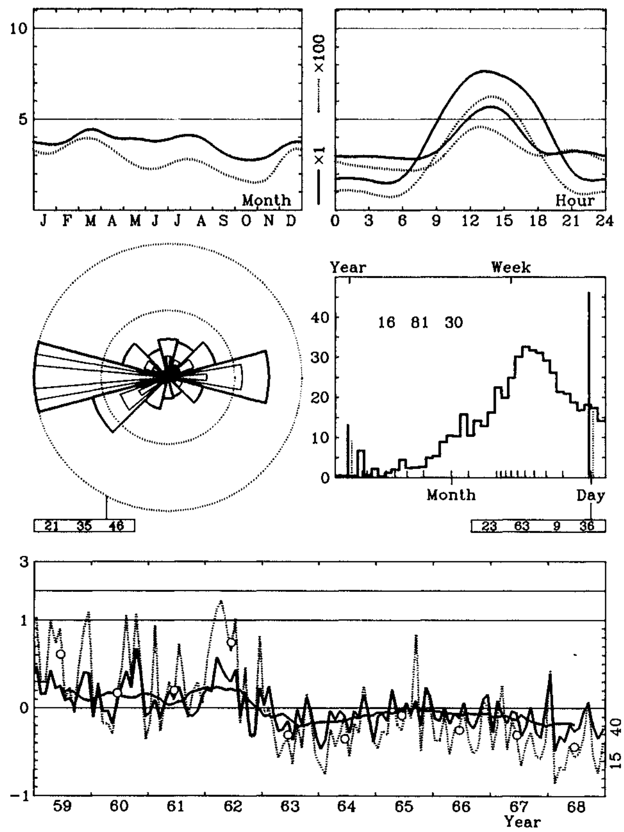
Nago, Italy 1984–87

12.0 m agl, mean 4.5 m/s, st dev 3.0 m/s, cube 228. m^3/s^3



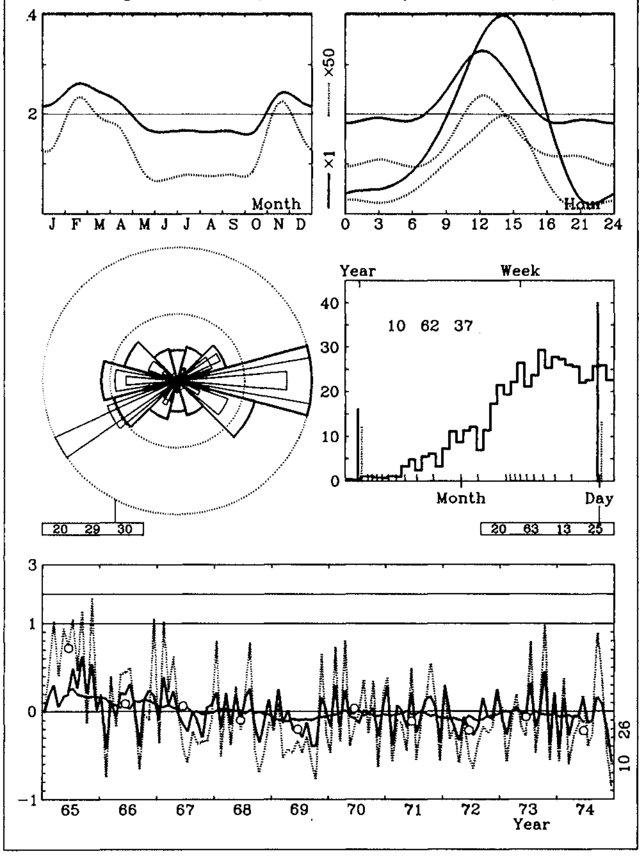
Olbia, Italy 1959–68

10.0 m agl, mean 3.7 m/s, st dev 3.9 m/s, cube 273. m^3/s^3



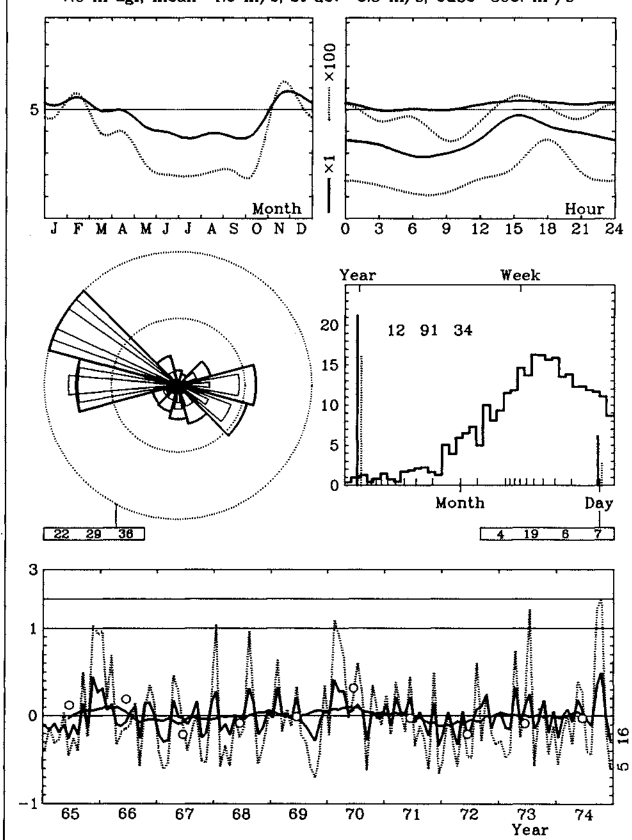
Pisa, Italy 1965–74

6.0 m agl, mean 2.0 m/s, st dev 2.5 m/s, cube 66. m^3/s^3



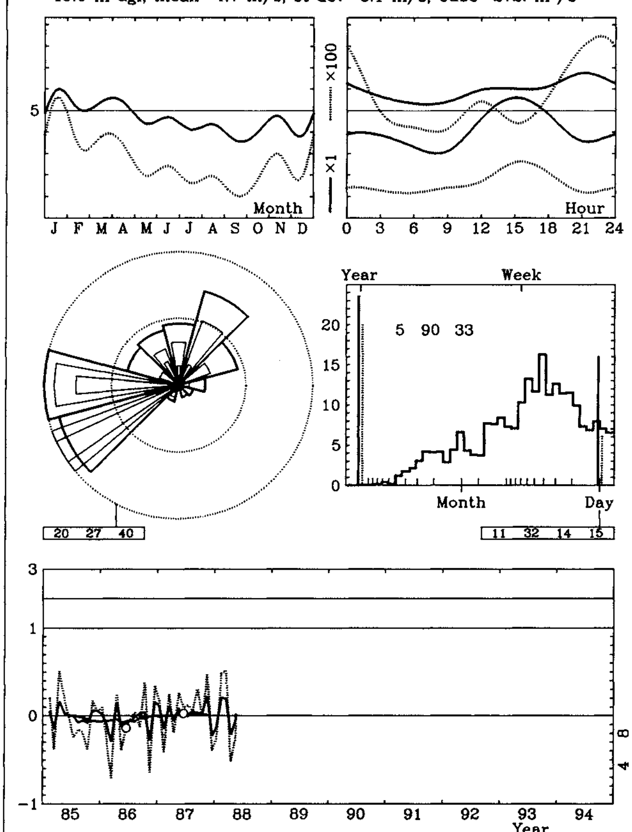
Ponza, Italy 1965–74

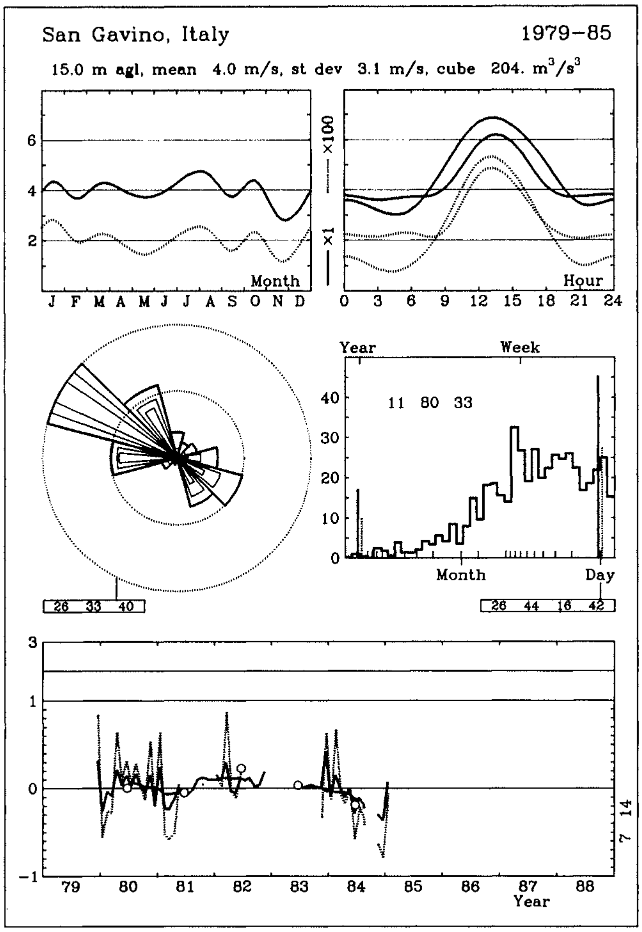
7.5 m agl, mean 4.6 m/s, st dev 3.8 m/s, cube 353. m^3/s^3

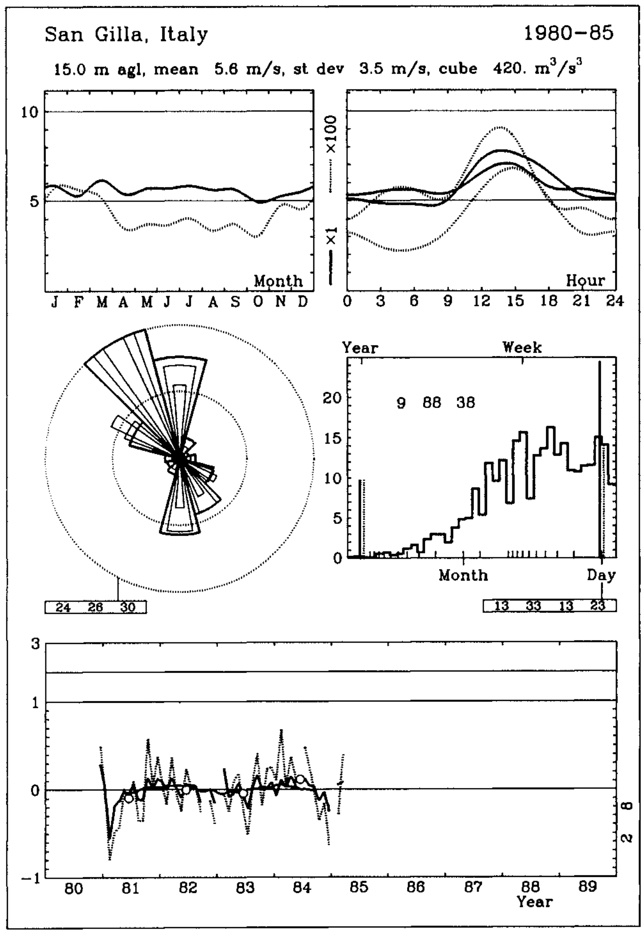


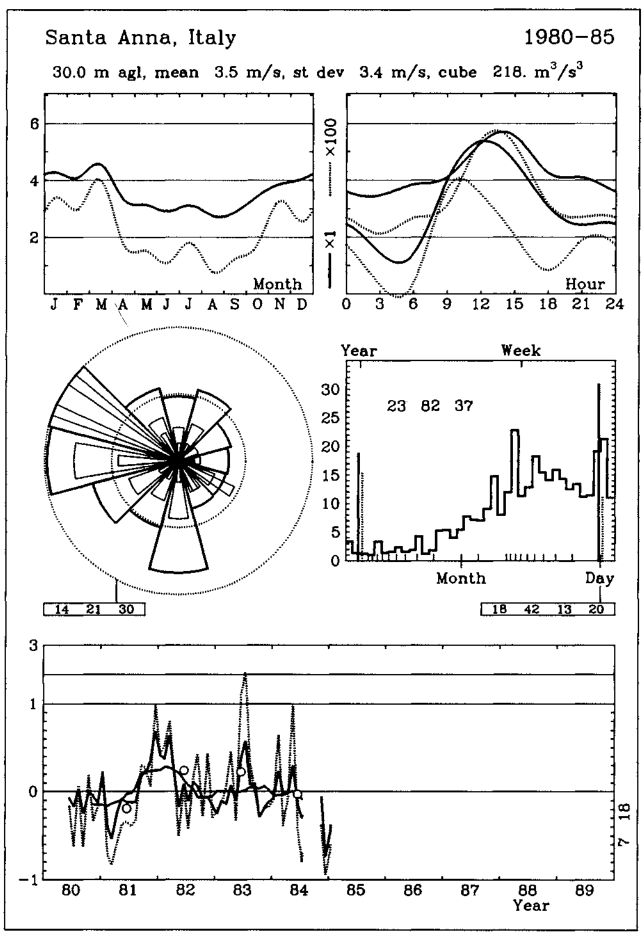
Salcito, Italy 1985–88

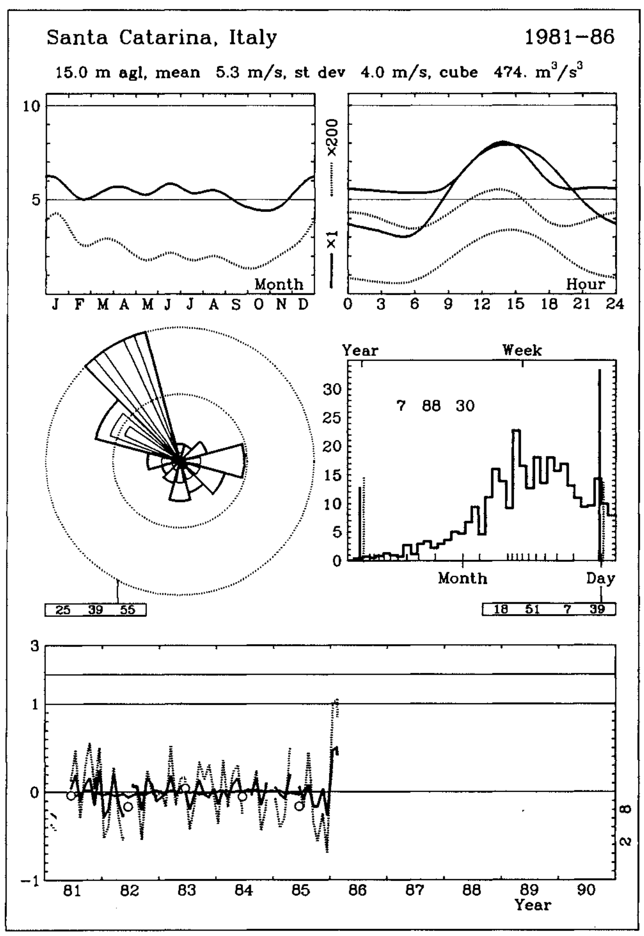
15.0 m agl, mean 4.7 m/s, st dev 3.1 m/s, cube 272. m^3/s^3




San Gavino, Italy
1979–85
15.0 m agl, mean 4.0 m/s, st dev 3.1 m/s, cube 204. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
11 80 33
Month
Day
26 33 40
26 44 16 42
7 14
79 80 81 82 83 84 85 86 87 88
Year

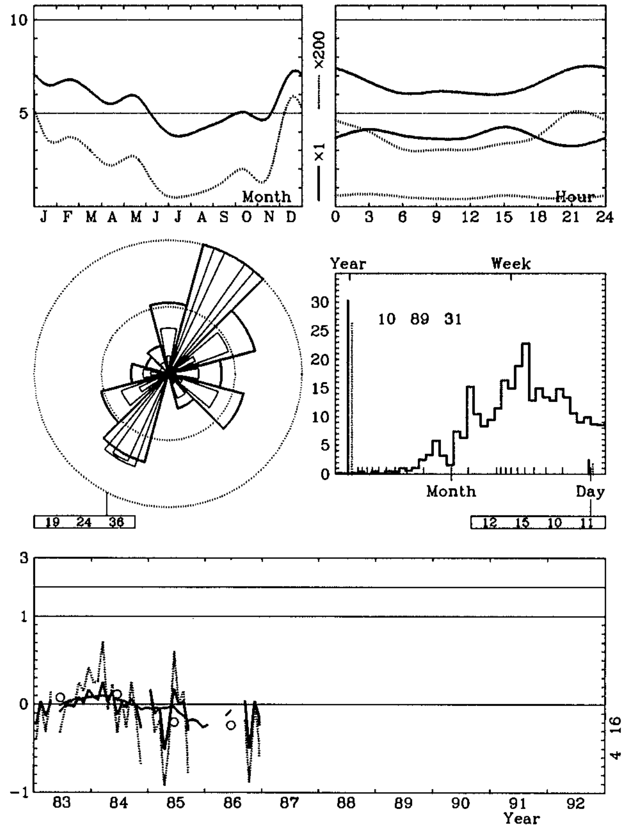

San Gilla, Italy
1980–85
15.0 m agl, mean 5.6 m/s, st dev 3.5 m/s, cube 420. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
9 88 38
Month
Day
24 26 30
13 33 13 23
2 8
80 81 82 83 84 85 86 87 88 89
Year


Santa Anna, Italy
1980–85
30.0 m agl, mean 3.5 m/s, st dev 3.4 m/s, cube 218. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
23 82 37
Month
Day
14 21 30
18 42 13 20
7 18
80 81 82 83 84 85 86 87 88 89
Year


Santa Catarina, Italy
1981–86
15.0 m agl, mean 5.3 m/s, st dev 4.0 m/s, cube 474. m³/s³
Month
J F M A M J J A S O N D
×200
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
7 88 30
Month
Day
25 39 55
18 51 7 39
2 8
81 82 83 84 85 86 87 88 89 90
Year

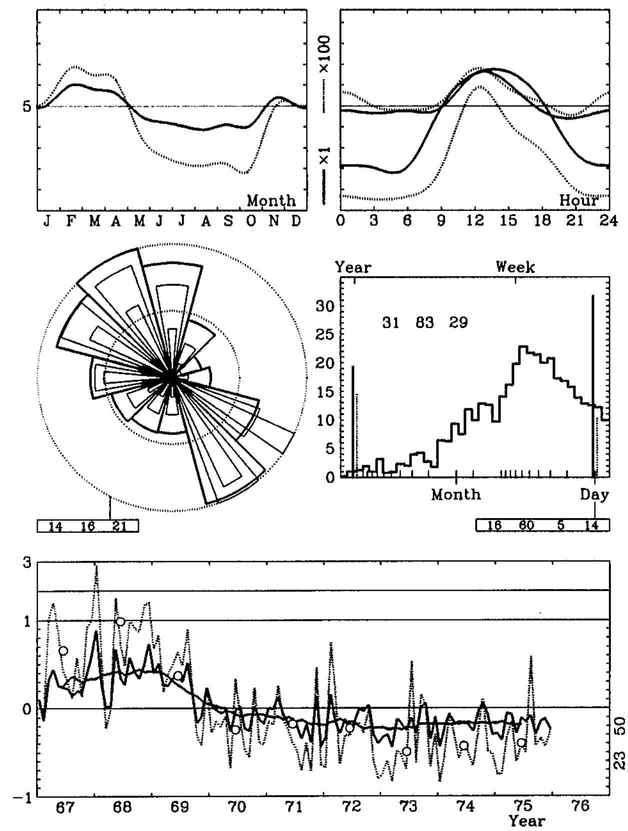
Scopeto, Italy 1983–86

15.0 m agl, mean 5.4 m/s, st dev 3.7 m/s, cube 456. m^3/s^3



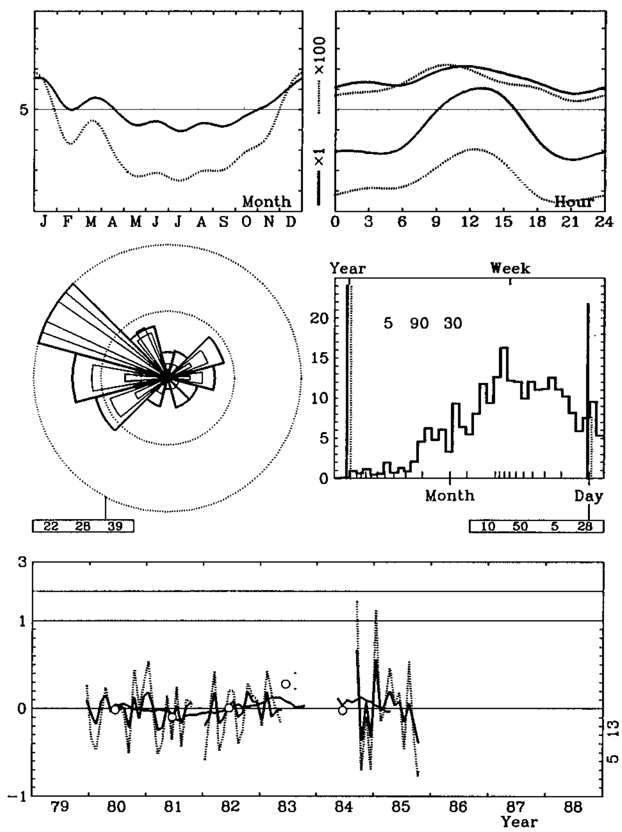
Trapani, Italy 1967–75

10.0 m agl, mean 4.8 m/s, st dev 4.0 m/s, cube 412. m^3/s^3



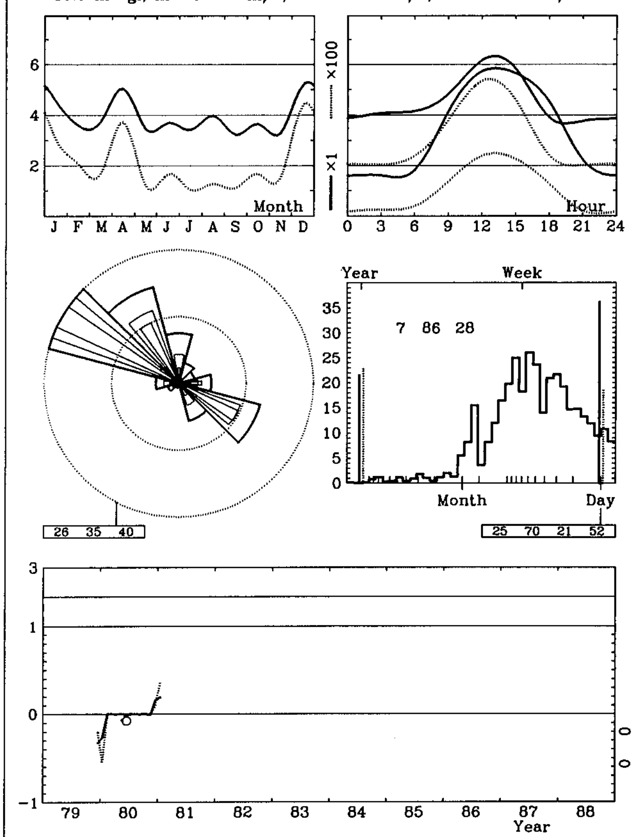
Unia, Italy 1979–85

15.0 m agl, mean 4.9 m/s, st dev 3.3 m/s, cube 318. m^3/s^3



Uras, Italy 1979–81

15.0 m agl, mean 4.0 m/s, st dev 3.2 m/s, cube 212. m^3/s^3



Findel

49° 37′ 00″ N 06° 12′ 00″ E	UTM 32 E 297744 m N 5499887 m	376 m a.s.l.

Location at the national airport of Luxembourg in an area with terrain height variations between 250 and 450 m. The valley and hill tops are smooth or have restricted dimensions. Seen from the station, the surrounding area gives an extremely open impression and seems to be flat or gently rolling. There are no obstacles present in a wide angle of view (30°-250°). This is because the airfield is situated at a higher level compared to the immediate surroundings. There is a slight upslope for the air coming from the NE and a slightly steeper upslope for air coming from the opposite side. A few airport buildings appear in the sector 260°-20°.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	700	0.30									-17	
30	0.01	1000	0.30									-4	
60	0.01	1250	0.30										
90	0.01	1100	0.30										
120	0.01	500	0.20										
150	0.01	600	0.15	2000	0.30								
180	0.01	700	0.15	2000	0.30								
210	0.01	1500	0.30										
240	0.01	1500	0.20	3000	0.30								
270	0.01	400	0.20	800	0.30							-5	
300	0.01	300	0.30										
330	0.01	400	0.30									-5	

Height of anemometer: 7.9 m a.g.l. Period: 70010103-79123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.8	94	198	292	216	123	53	19	4	1	0	0	0	0	0	3.2	2.10
30	8.3	48	119	220	212	182	108	61	30	15	4	0	0	0	0	4.2	2.17
60	16.2	34	86	173	233	185	125	86	50	17	11	1	0	0	0	4.6	2.18
90	6.1	65	179	241	205	128	81	47	31	14	8	1	0	0	0	3.8	1.76
120	4.4	112	261	307	173	86	33	17	8	3	1	0	0	0	0	2.9	1.81
150	3.8	156	272	271	185	74	30	9	4	0	0	0	0	0	0	2.8	1.92
180	7.3	108	184	222	201	138	83	42	12	7	3	0	0	0	0	3.6	1.93
210	9.0	75	130	207	207	132	89	63	47	26	19	4	0	0	0	4.2	1.70
240	13.3	48	91	130	138	128	102	127	90	64	61	18	5	2	0	5.8	1.96
270	15.7	46	103	160	169	162	117	111	62	32	30	7	2	0	0	5.0	1.98
300	6.8	83	222	244	189	136	60	36	13	9	7	2	0	0	0	3.4	1.71
330	4.3	116	250	274	191	96	41	24	5	3	0	0	0	0	0	3.0	1.87
Total	100.0	68	145	204	192	143	91	70	41	22	18	4	1	0	0	4.2	1.72

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.0	3.8	3.8	3.5	3.1	2.8	2.9	2.7	2.9	3.2	3.6	4.1	3.4
3	3.9	4.0	3.8	3.6	3.1	2.7	2.7	2.7	2.9	3.2	3.7	4.1	3.4
6	3.8	3.9	3.9	3.8	3.3	3.1	2.9	2.8	3.0	3.2	3.8	4.1	3.5
9	3.8	4.1	4.5	4.6	4.0	3.8	3.8	3.6	3.9	3.8	4.0	4.1	4.0
12	4.2	4.5	5.0	5.0	4.4	4.4	4.3	4.1	4.5	4.1	4.5	4.4	4.5
15	4.0	4.3	4.9	5.0	4.4	4.4	4.4	4.1	4.4	3.8	4.2	4.1	4.3
18	3.8	3.8	3.9	4.1	3.6	3.7	3.6	3.2	3.1	3.1	3.8	4.0	3.7
21	3.9	3.8	3.9	3.5	3.0	2.6	2.8	2.7	3.0	3.2	3.8	3.9	3.3
Day	3.9	4.0	4.2	4.2	3.6	3.4	3.4	3.2	3.5	3.4	3.9	4.1	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.6	7.1	6.6	5.2	4.5	5.3	6.2	8.1	8.8	7.5	5.6	6.9
	2.35	2.56	2.63	2.43	2.03	2.21	2.21	2.09	2.11	2.30	2.10	2.10	2.05
25	6.4	7.3	7.7	7.2	5.7	4.9	5.8	6.8	8.8	9.6	8.3	6.1	7.5
	2.43	2.63	2.71	2.50	2.10	2.28	2.28	2.15	2.17	2.35	2.16	2.17	2.10
50	6.8	7.8	8.3	7.8	6.1	5.3	6.3	7.3	9.4	10.2	8.9	6.5	8.1
	2.49	2.70	2.78	2.57	2.15	2.34	2.34	2.21	2.23	2.42	2.22	2.22	2.16
100	7.4	8.5	9.0	8.4	6.6	5.7	6.8	7.9	10.2	11.1	9.6	7.1	8.8
	2.42	2.62	2.70	2.49	2.08	2.27	2.27	2.14	2.17	2.36	2.15	2.15	2.10
200	8.2	9.4	9.9	9.3	7.3	6.3	7.5	8.7	11.2	12.1	10.6	7.8	9.7
	2.29	2.48	2.55	2.36	1.98	2.15	2.15	2.03	2.06	2.25	2.03	2.04	2.02
Freq	4.6	6.9	13.0	10.2	5.1	4.0	5.8	8.4	11.7	14.6	10.4	5.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.7	5.0	4.4	3.4	3.1	3.9	4.4	6.0	6.1	4.7	3.8	4.8
	2.04	2.15	2.21	1.87	1.70	1.86	1.89	1.71	1.91	1.97	1.69	1.82	1.77
25	5.1	5.6	5.9	5.2	4.0	3.7	4.7	5.3	7.1	7.3	5.6	4.5	5.8
	2.20	2.33	2.38	2.02	1.83	2.01	2.05	1.84	2.04	2.10	1.82	1.97	1.89
50	5.9	6.5	6.9	6.1	4.7	4.3	5.4	6.1	8.2	8.4	6.5	5.3	6.7
	2.48	2.62	2.68	2.28	2.06	2.26	2.30	2.07	2.24	2.31	2.05	2.21	2.08
100	7.0	7.7	8.1	7.2	5.6	5.1	6.4	7.3	9.6	9.8	7.7	6.3	7.9
	2.64	2.78	2.85	2.42	2.20	2.40	2.45	2.20	2.40	2.47	2.17	2.35	2.21
200	8.7	9.6	10.1	8.9	6.9	6.3	7.9	9.0	11.7	11.9	9.6	7.8	9.7
	2.52	2.66	2.72	2.31	2.10	2.30	2.34	2.10	2.31	2.37	2.08	2.25	2.15
Freq	4.7	7.8	15.0	7.7	4.6	3.9	6.7	8.8	12.7	15.1	8.2	4.7	100.0

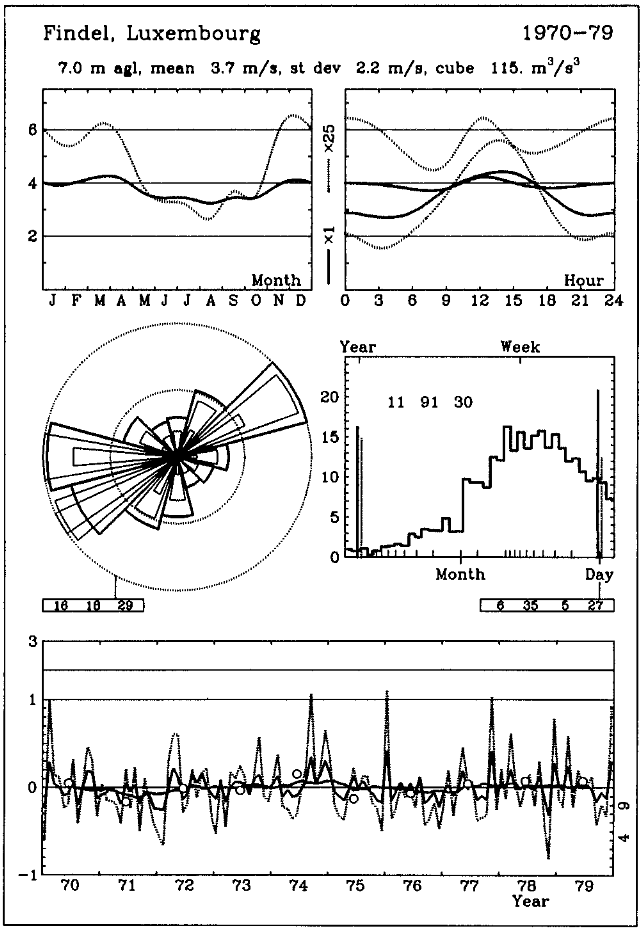
Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.1	4.3	3.7	2.9	2.7	3.4	3.9	5.3	5.3	3.8	3.3	4.2
	2.11	2.17	2.19	1.83	1.79	1.92	1.90	1.75	1.96	1.97	1.69	1.80	1.78
25	4.7	5.1	5.3	4.6	3.6	3.3	4.2	4.8	6.5	6.6	4.8	4.0	5.2
	2.26	2.33	2.35	1.96	1.91	2.05	2.03	1.87	2.08	2.08	1.80	1.93	1.88
50	5.5	5.9	6.3	5.4	4.2	3.9	4.9	5.7	7.6	7.6	5.6	4.7	6.1
	2.50	2.57	2.60	2.17	2.12	2.27	2.25	2.08	2.26	2.26	1.99	2.13	2.05
100	6.5	7.1	7.4	6.4	5.0	4.7	5.9	6.8	9.0	9.0	6.7	5.6	7.2
	2.75	2.83	2.85	2.38	2.33	2.49	2.47	2.28	2.48	2.49	2.19	2.35	2.23
200	8.0	8.7	9.2	7.9	6.2	5.7	7.3	8.4	10.9	10.9	8.2	6.9	8.9
	2.63	2.70	2.73	2.28	2.23	2.38	2.37	2.18	2.38	2.39	2.10	2.24	2.17
Freq	4.7	8.1	15.7	6.7	4.5	3.8	7.1	8.9	13.1	15.3	7.5	4.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.3	3.4	2.8	2.2	2.2	2.8	3.1	4.2	4.2	2.9	2.6	3.3
	2.12	2.16	2.16	1.79	1.78	1.85	1.91	1.70	2.00	1.97	1.77	1.90	1.79
25	4.0	4.3	4.4	3.7	2.9	2.9	3.6	4.2	5.6	5.5	3.8	3.4	4.4
	2.24	2.29	2.29	1.90	1.89	1.97	2.03	1.80	2.10	2.06	1.88	2.02	1.88
50	4.8	5.2	5.4	4.5	3.5	3.5	4.4	5.0	6.7	6.6	4.6	4.1	5.3
	2.44	2.49	2.49	2.06	2.05	2.13	2.20	1.96	2.25	2.21	2.04	2.19	2.01
100	5.8	6.2	6.4	5.4	4.3	4.2	5.3	6.1	7.9	7.8	5.5	5.0	6.3
	2.78	2.83	2.83	2.35	2.34	2.43	2.51	2.23	2.53	2.50	2.32	2.50	2.24
200	7.1	7.6	7.9	6.6	5.2	5.1	6.4	7.4	9.6	9.5	6.8	6.1	7.7
	2.67	2.73	2.73	2.26	2.26	2.35	2.42	2.15	2.47	2.42	2.24	2.40	2.20
Freq	5.1	8.9	15.5	6.0	4.4	4.0	7.4	9.3	13.2	15.3	6.7	4.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.1	258	4.3	104	3.7	69	2.9	33
25	6.7	331	5.1	165	4.6	121	3.9	72
50	7.2	399	5.9	230	5.4	178	4.7	117
100	7.8	519	7.0	359	6.4	276	5.6	185
200	8.6	725	8.6	694	7.8	521	6.8	339



Findel, Luxembourg
1970–79
7.0 m agl, mean 3.7 m/s, st dev 2.2 m/s, cube 115. m³/s³
Month
J F M A M J J A S O N D
×25
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
11 91 30
Month
Day
16 18 29
6 35 5 27
70 71 72 73 74 75 76 77 78 79
Year

Eelde

53°08′00″ N 06°35′00″ E	UTM 32 E 338322 m N 5889956 m	5 m a.s.l.

Location in the northern part of the Netherlands 10 km south of the city of Groningen, at the airport. The landscape is farmland with many trees and scattered villages. The anemometer is quite sheltered by a row of trees in the sector from ENE to SSE, but the landscape is open in other directions.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	700	0.30	2000	0.15								
30	0.01	700	0.20										
60	0.20											-3	
90	0.15											-9	
120	0.05	500	0.15									-10	
150	0.03	500	0.30	1000	0.15							-10	
180	0.03	500	0.15	1500	0.15							-9	
210	0.03	500	0.15									-6	
240	0.01	1500	0.15										
270	0.01	900	0.15										
300	0.01	900	0.15										
330	0.01	1200	0.30										

Height of anemometer: 10.0 m a.g.l. Period: 70010103-76123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.6	83	109	161	172	170	137	85	45	18	15	4	2	0	0	4.6	2.06
30	7.0	35	135	195	195	147	114	81	49	29	18	2	0	0	0	4.4	1.89
60	8.3	38	139	188	203	161	101	73	46	25	21	4	0	0	0	4.4	1.83
90	9.1	33	179	231	218	160	93	49	23	11	4	0	0	0	0	3.9	2.04
120	6.4	59	202	231	185	158	95	47	15	5	3	1	0	0	0	3.7	1.97
150	5.5	63	177	215	189	146	92	63	28	16	11	0	0	0	0	4.0	1.85
180	9.2	30	103	188	168	156	120	95	58	34	35	11	2	0	0	4.9	1.87
210	12.7	16	70	122	168	161	148	114	66	50	61	20	3	1	0	5.7	2.03
240	14.4	22	73	114	123	131	128	118	89	66	89	33	11	4	0	6.4	2.00
270	9.5	29	114	115	129	122	111	110	90	48	76	35	14	3	4	6.1	1.77
300	6.7	44	133	153	129	121	115	107	74	48	50	16	7	3	1	5.4	1.78
330	5.7	31	110	120	135	153	156	122	75	40	41	10	4	0	1	5.5	2.16
Total	100.0	36	121	163	165	148	119	92	59	36	42	14	4	1	1	5.0	1.76

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.2	4.4	4.0	3.9	3.3	2.8	3.0	2.5	3.1	3.7	5.1	5.2	3.8
3	5.2	4.2	4.0	3.9	3.3	2.9	3.0	2.4	3.1	3.5	5.0	5.2	3.8
6	5.1	4.3	4.1	4.0	3.7	3.2	3.3	2.5	3.1	3.6	4.9	5.3	3.9
9	5.2	4.6	5.0	5.5	4.9	4.5	4.8	4.1	4.3	4.1	5.2	5.4	4.8
12	5.8	5.3	6.0	6.2	5.5	5.1	5.5	4.9	5.3	4.9	6.1	6.0	5.6
15	5.5	5.3	6.0	6.5	5.6	5.4	5.6	5.1	5.2	4.7	5.7	5.6	5.5
18	5.2	4.3	4.5	5.5	4.9	4.9	4.9	4.0	3.7	3.6	5.2	5.3	4.7
21	5.4	4.3	4.2	4.1	3.4	3.1	3.1	2.7	3.1	3.6	5.2	5.4	4.0
Day	5.3	4.6	4.7	4.9	4.3	4.0	4.2	3.5	3.9	4.0	5.3	5.4	4.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	6.8	7.9	7.8	7.0	6.9	8.3	9.2	9.2	8.9	8.2	8.1	8.2
	2.44	2.33	2.13	2.30	2.37	2.21	2.12	2.25	2.31	2.11	2.03	2.35	2.15
25	8.1	7.4	8.6	8.5	7.7	7.5	9.0	10.1	10.0	9.7	9.0	8.9	8.9
	2.52	2.40	2.19	2.37	2.45	2.28	2.17	2.30	2.37	2.16	2.08	2.42	2.20
50	8.7	8.0	9.3	9.2	8.3	8.1	9.7	10.8	10.7	10.4	9.6	9.5	9.6
	2.58	2.47	2.25	2.43	2.51	2.34	2.23	2.37	2.44	2.22	2.14	2.49	2.26
100	9.4	8.6	10.0	9.9	9.0	8.7	10.4	11.6	11.6	11.1	10.4	10.3	10.3
	2.50	2.39	2.18	2.35	2.44	2.27	2.17	2.31	2.38	2.17	2.09	2.41	2.21
200	10.4	9.6	11.1	11.0	9.9	9.7	11.4	12.6	12.6	12.1	11.4	11.4	11.4
	2.37	2.26	2.07	2.23	2.30	2.15	2.07	2.22	2.28	2.09	2.00	2.28	2.12
Freq	5.6	6.5	7.7	8.7	7.4	5.9	7.9	11.5	13.9	11.2	7.7	6.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	4.7	5.8	5.3	4.8	4.8	6.0	6.6	6.4	6.2	5.6	5.7	5.7
	2.02	1.91	1.82	1.98	1.96	1.83	1.84	1.99	2.00	1.79	1.76	2.07	1.85
25	5.9	5.6	6.9	6.3	5.7	5.8	7.1	7.8	7.6	7.4	6.7	6.9	6.8
	2.18	2.06	1.94	2.13	2.12	1.98	1.95	2.10	2.12	1.88	1.88	2.24	1.97
50	6.8	6.5	7.9	7.3	6.6	6.7	8.1	8.9	8.7	8.4	7.7	7.9	7.8
	2.45	2.32	2.15	2.40	2.38	2.22	2.14	2.27	2.31	2.03	2.09	2.51	2.16
100	8.1	7.8	9.3	8.7	7.8	8.0	9.5	10.3	10.1	9.7	9.1	9.4	9.2
	2.61	2.47	2.30	2.55	2.53	2.37	2.30	2.44	2.49	2.18	2.23	2.68	2.32
200	10.1	9.6	11.3	10.8	9.8	9.9	11.5	12.3	12.1	11.6	11.1	11.7	11.2
	2.49	2.36	2.20	2.44	2.42	2.26	2.20	2.35	2.39	2.10	2.14	2.56	2.26
Freq	5.6	6.8	8.0	8.9	6.8	5.6	8.7	12.3	14.4	10.0	7.0	5.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.1	5.1	4.6	4.1	4.3	5.3	5.8	5.6	5.4	4.8	5.0	5.0
	2.03	1.92	1.85	2.01	1.97	1.82	1.85	2.01	2.00	1.77	1.77	2.12	1.86
25	5.2	5.1	6.3	5.7	5.1	5.3	6.4	7.1	6.8	6.6	5.9	6.2	6.1
	2.17	2.06	1.96	2.15	2.11	1.95	1.95	2.11	2.10	1.85	1.89	2.26	1.96
50	6.1	6.0	7.3	6.6	6.0	6.2	7.5	8.2	7.9	7.7	7.0	7.3	7.2
	2.40	2.28	2.14	2.38	2.33	2.15	2.11	2.26	2.27	1.98	2.07	2.51	2.13
100	7.3	7.1	8.6	7.9	7.1	7.4	8.8	9.5	9.2	8.9	8.3	8.6	8.4
	2.64	2.50	2.35	2.62	2.56	2.37	2.32	2.47	2.49	2.17	2.28	2.76	2.34
200	9.0	8.8	10.5	9.8	8.8	9.1	10.6	11.4	11.1	10.6	10.1	10.7	10.2
	2.53	2.40	2.26	2.51	2.45	2.27	2.23	2.39	2.40	2.10	2.19	2.63	2.28
Freq	5.6	7.0	8.1	9.0	6.6	5.5	9.1	12.6	14.5	9.6	6.8	5.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.3	4.0	3.6	3.2	3.5	4.2	4.5	4.4	4.2	3.8	3.9	3.9
	2.02	1.87	1.87	2.02	1.96	1.81	1.89	2.02	1.99	1.77	1.81	2.11	1.86
25	4.3	4.3	5.3	4.7	4.3	4.6	5.5	5.9	5.7	5.5	5.0	5.1	5.2
	2.14	1.98	1.97	2.14	2.08	1.92	1.98	2.10	2.07	1.84	1.92	2.24	1.95
50	5.2	5.3	6.3	5.7	5.1	5.5	6.6	7.1	6.8	6.6	6.1	6.2	6.2
	2.32	2.15	2.11	2.32	2.26	2.09	2.11	2.22	2.20	1.94	2.07	2.43	2.09
100	6.3	6.3	7.6	6.8	6.2	6.7	7.8	8.4	8.1	7.8	7.3	7.4	7.4
	2.65	2.45	2.39	2.65	2.58	2.38	2.35	2.45	2.45	2.13	2.36	2.77	2.33
200	7.7	7.7	9.2	8.4	7.6	8.1	9.4	10.0	9.7	9.3	8.9	9.1	9.0
	2.55	2.36	2.31	2.55	2.48	2.30	2.30	2.42	2.41	2.12	2.28	2.67	2.30
Freq	5.7	6.9	8.4	8.9	6.3	5.8	9.5	13.1	13.8	9.2	6.6	5.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	415	5.1	166	4.4	110	3.5	53
25	7.9	529	6.0	263	5.4	193	4.6	115
50	8.5	636	6.9	364	6.3	281	5.5	186
100	9.2	818	8.1	550	7.5	426	6.6	289
200	10.1	1122	9.9	1021	9.1	775	7.9	515

Eindhoven

51° 27′ 00″ N 05° 25′ 00″ E	UTM 31 E 667927 m N 5702756 m	20 m a.s.l.

Location in the south of the Netherlands 3 km W of the city of Eindhoven, in a military airport. The landscape is farmland with regular shelterbelts and woods, hence it appears rather closed. The anemometer is placed south of the runways. In the sector 210°-320° the terrain is quite open. Trees shelter the anemometer in the 150°-180° sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.20										
30	0.01	600	0.30										
60	0.01	500	0.30										
90	0.01	700	0.20	1500	0.40								
120	0.01	170	0.05	1000	0.40								
150	0.01	170	0.05	1250	0.20								
180	0.01	500	0.05	1000	0.20								
210	0.01	1000	0.05	2500	0.30								
240	0.01	700	0.08	2500	0.20								
270	0.01	1000	0.15										
300	0.01	1250	0.15										
330	0.01	1250	0.15										

Height of anemometer: 10.0 m a.g.l. Period: 70010103–76123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.7	244	156	138	160	117	74	76	18	12	4	0	0	0	0	3.5	1.65
30	8.4	48	137	199	218	150	105	89	33	13	7	1	0	0	0	4.2	2.01
60	8.8	49	102	138	223	157	146	110	37	27	10	1	0	0	0	4.7	2.20
90	5.4	68	89	142	217	174	149	104	36	15	6	0	0	0	0	4.6	2.35
120	6.1	69	128	208	252	154	97	62	18	5	7	0	0	0	0	4.0	2.14
150	6.3	80	204	266	221	115	66	41	5	1	2	0	0	0	0	3.4	1.97
180	6.7	62	175	190	202	120	95	86	35	20	11	3	0	0	0	4.1	1.77
210	12.6	38	84	119	141	107	137	143	76	61	67	21	5	1	0	6.0	2.17
240	16.3	23	47	78	128	139	153	179	95	77	56	21	3	0	1	6.4	2.59
270	10.0	49	85	107	147	125	119	142	72	64	51	27	9	1	1	5.9	1.99
300	7.2	66	108	138	143	128	123	101	64	51	52	19	6	1	1	5.4	1.79
330	5.5	83	140	157	158	127	115	111	43	37	24	6	0	0	0	4.6	1.85
Total	100.0	65	110	145	176	133	120	115	52	39	31	11	2	0	0	5.0	1.86

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.8	4.0	3.8	3.8	3.2	2.8	2.9	2.8	2.9	3.5	4.5	4.7	3.6
3	4.8	4.0	3.7	3.8	3.4	2.6	2.8	2.7	2.9	3.5	4.5	4.7	3.6
6	4.8	4.0	3.7	4.4	4.1	3.8	3.6	3.5	3.3	3.7	4.6	4.8	4.0
9	5.2	4.7	5.0	5.6	5.1	4.8	5.0	4.8	4.8	4.7	5.5	5.1	5.0
12	5.6	5.5	5.7	6.1	5.5	5.3	5.4	5.4	5.3	5.3	6.2	5.6	5.6
15	5.0	5.0	5.3	6.1	5.4	5.3	5.4	5.2	4.8	4.5	5.1	4.9	5.2
18	4.8	4.2	3.8	4.6	4.1	4.2	4.1	3.6	3.2	3.6	4.8	4.7	4.1
21	4.8	4.3	3.8	4.1	3.2	2.9	3.0	3.0	3.0	3.7	4.7	4.7	3.8
Day	5.0	4.5	4.3	4.8	4.3	4.0	4.0	3.9	3.8	4.1	5.0	4.9	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.1	7.1	7.2	6.8	5.9	5.9	8.3	9.3	9.0	8.1	7.2	7.6
	2.05	2.23	2.50	2.68	2.60	2.38	2.12	2.36	2.88	2.66	2.19	2.14	2.25
25	6.3	6.7	7.7	7.9	7.5	6.4	6.5	9.0	10.1	9.9	8.9	7.8	8.3
	2.12	2.30	2.58	2.77	2.69	2.46	2.18	2.43	2.97	2.74	2.26	2.21	2.31
50	6.8	7.2	8.3	8.4	8.0	6.9	6.9	9.7	10.9	10.6	9.5	8.4	8.9
	2.17	2.36	2.65	2.84	2.76	2.53	2.24	2.49	3.05	2.81	2.32	2.27	2.37
100	7.4	7.8	9.0	9.2	8.7	7.5	7.5	10.5	11.8	11.5	10.3	9.1	9.6
	2.10	2.29	2.56	2.75	2.67	2.44	2.17	2.42	2.95	2.73	2.25	2.20	2.30
200	8.1	8.6	10.0	10.1	9.6	8.3	8.3	11.6	13.0	12.7	11.4	10.1	10.6
	1.99	2.17	2.43	2.60	2.53	2.31	2.05	2.29	2.80	2.59	2.14	2.08	2.20
Freq	6.1	7.8	8.7	6.8	5.8	6.2	6.6	10.4	15.0	12.3	8.3	6.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	4.5	5.1	5.0	4.7	3.9	4.3	6.0	6.6	6.2	5.5	4.8	5.3
	1.66	1.94	2.20	2.33	2.14	1.98	1.75	2.09	2.50	2.08	1.81	1.82	1.94
25	4.5	5.3	6.1	6.0	5.6	4.7	5.1	7.2	7.8	7.3	6.6	5.7	6.3
	1.79	2.10	2.37	2.51	2.31	2.13	1.88	2.25	2.70	2.24	1.95	1.96	2.07
50	5.2	6.2	7.1	6.9	6.5	5.4	5.9	8.3	9.0	8.4	7.6	6.6	7.3
	2.01	2.35	2.67	2.83	2.60	2.40	2.12	2.52	3.03	2.49	2.18	2.21	2.28
100	6.2	7.3	8.4	8.2	7.7	6.4	7.0	9.8	10.6	9.9	9.0	7.9	8.6
	2.15	2.51	2.84	3.01	2.77	2.55	2.26	2.69	3.22	2.66	2.32	2.35	2.42
200	7.7	9.1	10.4	10.2	9.6	8.0	8.7	12.2	13.2	12.2	11.2	9.8	10.7
	2.05	2.39	2.71	2.87	2.64	2.44	2.15	2.56	3.08	2.55	2.22	2.24	2.33
Freq	6.4	8.2	8.8	5.9	5.9	6.3	6.7	11.9	15.8	10.8	7.6	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	4.0	4.5	4.4	4.1	3.3	3.8	5.3	5.7	5.3	4.8	4.1	4.6
	1.63	2.01	2.16	2.33	2.11	1.95	1.79	2.10	2.56	2.02	1.79	1.86	1.94
25	3.9	4.9	5.5	5.4	5.0	4.1	4.7	6.5	7.1	6.5	5.9	5.1	5.7
	1.74	2.15	2.31	2.49	2.26	2.09	1.92	2.24	2.74	2.15	1.91	1.99	2.05
50	4.6	5.8	6.5	6.3	5.9	4.8	5.5	7.7	8.3	7.6	6.9	6.0	6.7
	1.93	2.38	2.56	2.76	2.50	2.31	2.13	2.47	3.02	2.35	2.11	2.20	2.24
100	5.5	6.9	7.7	7.5	7.0	5.8	6.6	9.1	9.8	9.0	8.2	7.1	7.9
	2.12	2.62	2.81	3.03	2.74	2.54	2.33	2.72	3.32	2.59	2.31	2.42	2.42
200	6.8	8.5	9.5	9.3	8.6	7.1	8.1	11.1	12.1	10.9	10.1	8.8	9.7
	2.03	2.50	2.69	2.90	2.63	2.43	2.24	2.61	3.18	2.48	2.22	2.31	2.34
Freq	6.6	8.3	8.8	5.6	6.0	6.3	6.7	12.4	16.1	10.3	7.3	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	3.2	3.5	3.4	3.1	2.7	3.1	4.2	4.5	4.1	3.7	3.1	3.6
	1.70	1.99	2.19	2.29	2.06	1.96	1.75	2.15	2.54	1.99	1.77	1.83	1.93
25	3.4	4.2	4.7	4.5	4.1	3.5	4.1	5.6	5.9	5.4	4.9	4.1	4.8
	1.79	2.12	2.32	2.43	2.19	2.07	1.85	2.28	2.69	2.09	1.88	1.94	2.03
50	4.1	5.0	5.6	5.4	5.0	4.2	5.0	6.7	7.1	6.5	5.9	5.0	5.7
	1.95	2.30	2.53	2.64	2.37	2.25	2.01	2.46	2.92	2.25	2.05	2.10	2.18
100	4.9	6.1	6.8	6.5	6.0	5.1	6.0	8.0	8.5	7.8	7.1	6.0	6.9
	2.22	2.62	2.88	3.01	2.70	2.56	2.29	2.80	3.32	2.56	2.33	2.40	2.44
200	6.0	7.4	8.3	7.9	7.3	6.2	7.3	9.8	10.4	9.4	8.7	7.4	8.4
	2.14	2.52	2.77	2.90	2.60	2.47	2.21	2.70	3.20	2.47	2.24	2.31	2.37
Freq	6.8	8.4	8.6	5.4	6.2	6.4	7.2	12.9	15.8	9.8	7.1	5.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.7	314	4.7	124	4.1	81	3.2	39
25	7.3	403	5.6	198	5.0	144	4.2	86
50	7.9	491	6.5	280	5.9	215	5.1	141
100	8.5	638	7.7	446	7.0	340	6.1	226
200	9.4	893	9.5	875	8.6	652	7.5	419

Leeuwarden

53° 13′ 00″ N 05° 46′ 00″ E	UTM 31 E 684729 m N 5900071 m	0 m a.s.l.

Location in the north of the Netherlands 3 km NW of the city of Leeuwarden. The landscape is a polder with scattered villages. The anemometer is placed south of a runway in a military airport. Since 1971 sheltered by buildings to the south.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	800	0.05	12000	0.00							-2	
30	0.01	800	0.10	15000	0.00								
60	0.01	800	0.10										
90	0.01	800	0.10									-2	
120	0.01	1000	0.20	1600	0.40	8000	0.10					-1	
150	0.01	600	0.10	1200	0.40	6000	0.10					-1	
180	0.01	350	0.20	4000	0.10							-8	
210	0.01	600	0.10									-3	
240	0.01	1100	0.10									-1	
270	0.01	700	0.10	18000	0.00							-2	
300	0.01	1100	0.05	13000	0.00							-2	
330	0.01	1000	0.05	12000	0.00							-2	

Height of anemometer: 10.0 m a.g.l. Period: 70010103–76123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.6	105	134	113	158	131	146	101	43	32	23	9	3	1	0	4.8	1.89
30	7.2	27	102	136	177	136	151	131	65	35	32	7	1	0	0	5.3	2.21
60	8.9	30	88	135	210	150	132	103	52	50	37	9	2	2	0	5.1	1.91
90	8.2	21	91	135	189	168	153	114	57	32	31	8	0	0	0	5.2	2.18
120	5.2	25	83	102	169	191	181	170	45	21	13	1	0	0	0	5.3	2.85
150	6.5	27	110	136	186	157	141	141	49	30	19	5	0	0	0	5.0	2.26
180	10.5	26	110	165	192	142	111	102	53	40	44	11	3	1	0	5.0	1.79
210	11.7	18	81	102	150	130	142	139	77	54	60	37	7	2	0	6.1	2.07
240	11.6	18	56	79	123	118	115	144	96	84	106	40	15	4	1	7.0	2.27
270	9.1	19	59	93	110	110	119	151	96	79	87	50	17	8	3	7.0	2.11
300	7.6	19	68	93	151	107	134	132	90	68	75	37	11	7	8	6.6	1.86
330	6.9	30	92	107	128	130	122	149	83	62	58	24	9	4	2	6.1	2.01
Total	100.0	28	87	116	161	137	134	130	69	52	53	22	6	3	1	5.8	1.95

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.8	5.0	4.7	4.3	3.8	3.2	3.3	3.1	3.4	4.2	5.7	5.8	4.4
3	5.8	5.0	4.8	4.3	3.9	3.3	3.3	3.0	3.5	4.2	5.5	5.8	4.4
6	5.8	5.0	4.8	5.0	4.8	4.4	4.3	3.5	3.7	4.3	5.7	5.8	4.8
9	5.9	5.5	6.1	6.4	5.6	5.2	5.6	5.1	5.3	5.2	6.2	6.0	5.7
12	6.4	6.1	6.8	7.0	6.1	5.9	6.1	5.7	6.0	5.8	6.8	6.5	6.3
15	5.9	5.6	6.5	6.9	6.3	6.0	6.1	5.7	5.5	4.9	6.1	6.0	6.0
18	5.9	5.0	4.9	5.3	4.7	4.7	4.8	3.9	3.8	4.3	5.9	5.9	4.9
21	5.9	4.9	4.8	4.5	3.8	3.2	3.5	3.1	3.7	4.3	5.8	5.8	4.4
Day	5.9	5.3	5.4	5.5	4.9	4.5	4.6	4.1	4.4	4.6	6.0	6.0	5.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	6.8	7.5	7.6	7.8	7.8	8.4	9.0	9.6	9.7	8.7	8.0	8.3
	1.88	2.17	2.34	2.48	3.02	2.83	2.11	2.29	2.51	2.28	1.88	1.94	2.15
25	7.3	7.4	8.2	8.3	8.5	8.5	9.2	9.8	10.5	10.6	9.5	8.8	9.1
	1.94	2.24	2.42	2.56	3.11	2.92	2.16	2.35	2.57	2.33	1.92	1.99	2.21
50	7.8	8.0	8.8	8.9	9.1	9.1	9.8	10.5	11.2	11.3	10.2	9.4	9.7
	1.99	2.30	2.48	2.63	3.19	2.99	2.22	2.41	2.64	2.39	1.98	2.04	2.27
100	8.5	8.6	9.5	9.6	9.9	9.9	10.6	11.3	12.1	12.2	10.9	10.1	10.5
	1.92	2.22	2.40	2.55	3.09	2.90	2.17	2.35	2.58	2.35	1.93	1.99	2.22
200	9.4	9.6	10.5	10.7	11.0	11.0	11.6	12.4	13.2	13.2	11.9	11.1	11.5
	1.82	2.10	2.28	2.41	2.93	2.74	2.07	2.25	2.48	2.26	1.86	1.89	2.14
Freq	6.6	7.1	8.4	8.4	6.1	6.1	9.3	11.5	11.7	9.8	8.0	7.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.8	5.2	5.3	5.6	5.4	5.9	6.4	6.9	6.9	5.9	5.4	5.8
	1.55	1.89	1.91	2.15	2.74	2.25	1.78	2.03	2.26	1.99	1.61	1.66	1.86
25	5.2	5.8	6.2	6.4	6.6	6.5	7.1	7.6	8.2	8.2	7.0	6.5	6.9
	1.67	2.04	2.06	2.32	2.96	2.43	1.88	2.15	2.38	2.08	1.69	1.78	1.98
50	6.0	6.7	7.2	7.3	7.6	7.5	8.1	8.7	9.4	9.3	8.0	7.6	8.0
	1.87	2.29	2.32	2.60	3.33	2.73	2.05	2.35	2.59	2.22	1.83	1.99	2.17
100	7.1	8.0	8.6	8.7	9.0	8.9	9.4	10.1	10.8	10.6	9.3	8.9	9.3
	1.99	2.44	2.47	2.78	3.55	2.91	2.20	2.52	2.78	2.39	1.96	2.13	2.33
200	8.9	9.9	10.6	10.8	11.3	11.0	11.3	12.2	13.0	12.6	11.1	11.1	11.3
	1.90	2.33	2.36	2.65	3.39	2.78	2.12	2.42	2.68	2.31	1.89	2.03	2.27
Freq	6.6	7.2	8.8	8.2	5.3	6.4	10.3	11.8	11.6	9.2	7.7	6.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.3	4.6	4.7	4.8	4.8	5.2	5.6	6.0	6.0	5.1	4.7	5.1
	1.60	1.89	1.92	2.18	2.75	2.17	1.79	2.06	2.21	1.95	1.60	1.65	1.86
25	4.7	5.3	5.6	5.8	6.0	5.9	6.4	6.9	7.4	7.3	6.3	5.8	6.2
	1.71	2.02	2.06	2.34	2.94	2.33	1.88	2.17	2.32	2.03	1.68	1.76	1.96
50	5.5	6.2	6.6	6.7	7.0	6.9	7.4	8.0	8.5	8.4	7.3	6.8	7.3
	1.89	2.24	2.28	2.59	3.26	2.58	2.03	2.35	2.49	2.15	1.80	1.94	2.13
100	6.6	7.3	7.8	8.0	8.3	8.2	8.7	9.4	9.9	9.8	8.5	8.1	8.6
	2.08	2.46	2.50	2.84	3.58	2.83	2.23	2.58	2.73	2.36	1.98	2.13	2.34
200	8.1	9.1	9.7	9.9	10.2	10.1	10.4	11.3	11.9	11.5	10.2	10.0	10.4
	1.99	2.35	2.39	2.72	3.42	2.71	2.15	2.48	2.63	2.28	1.91	2.05	2.29
Freq	6.6	7.3	8.8	8.0	5.3	6.6	10.7	11.7	11.4	9.1	7.6	6.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.3	3.6	3.7	3.8	3.8	4.2	4.5	4.8	4.7	4.0	3.5	4.0
	1.63	1.83	1.96	2.24	2.69	2.08	1.85	2.08	2.23	1.95	1.60	1.61	1.87
25	4.0	4.4	4.7	4.9	5.0	5.0	5.4	5.8	6.2	6.1	5.2	4.7	5.2
	1.73	1.94	2.08	2.38	2.85	2.21	1.93	2.18	2.32	2.02	1.67	1.71	1.96
50	4.8	5.3	5.7	5.9	6.0	6.0	6.5	7.0	7.4	7.3	6.3	5.7	6.3
	1.87	2.11	2.26	2.59	3.09	2.40	2.06	2.32	2.45	2.12	1.77	1.85	2.09
100	5.8	6.4	6.9	7.0	7.2	7.3	7.8	8.3	8.8	8.6	7.5	6.9	7.5
	2.13	2.40	2.57	2.95	3.52	2.73	2.29	2.58	2.71	2.31	1.96	2.10	2.34
200	7.1	7.8	8.4	8.6	8.8	8.9	9.3	10.0	10.5	10.1	8.9	8.4	9.1
	2.05	2.31	2.48	2.84	3.39	2.63	2.25	2.53	2.68	2.31	1.93	2.03	2.31
Freq	6.7	7.5	8.7	7.6	5.4	7.1	10.8	11.7	11.1	8.9	7.5	6.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.3	432	5.2	173	4.5	114	3.5	55
25	8.0	552	6.1	273	5.5	200	4.6	119
50	8.6	664	7.0	379	6.4	293	5.6	193
100	9.3	851	8.3	571	7.6	442	6.7	301
200	10.2	1160	10.0	1056	9.2	802	8.0	533

Schiphol

52° 18′ 00″ N 04° 46′ 00″ E	UTM 31 E 620471 m N 5795996 m	−4 m a.s.l.

Location in the western part of the Netherlands at the national airport. In the northeast quadrant the Amsterdam urban area begins at a distance of approx. 3 km, while towards the west and south the region consists of flat polder land with occasional villages and tree-lined roads. The anemometer is placed between two runways. To the southwest there is a nearby dense patch of trees and small buildings, and to the northwest the large airport buildings lie at a distance of approx. 1 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	4000	0.40										
30	0.01	3000	0.40										
60	0.01	2500	0.40										
90	0.01	1200	0.40										
120	0.01	900	0.40	1800	0.20								
150	0.01	1500	0.20										
180	0.01	100	0.20	200	0.01	2500	0.20						
210	0.01	80	0.20	150	0.01	3000	0.10	4000	0.20				
240	0.01	70	0.20	120	0.01	3500	0.10	5000	0.20				
270	0.01	100	0.20	150	0.01	1300	0.30	1800	0.03	21000	0.00		
300	0.01	1000	0.30	2200	0.01	4500	0.10	20000	0.00				
330	0.01	700	0.30	2000	0.01	4500	0.10						

Height of anemometer: 10.0 m a.g.l.

Period: 70010103–76123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.4	101	109	193	177	122	122	88	43	23	18	3	2	0	1	4.4	1.73
30	7.8	23	75	109	162	160	148	119	66	58	60	17	2	1	0	5.7	2.09
60	8.6	23	77	122	161	154	134	131	82	46	52	13	5	0	0	5.7	2.12
90	7.1	31	74	161	234	190	131	83	56	21	17	3	0	0	0	4.7	2.13
120	5.6	50	109	193	215	175	111	106	23	11	5	2	0	0	0	4.3	2.18
150	6.7	33	101	162	186	138	145	104	57	37	32	4	1	0	0	5.0	2.06
180	9.5	23	80	163	186	156	116	97	72	35	53	14	4	1	1	5.2	1.79
210	11.9	17	67	126	178	145	127	115	75	49	58	31	10	2	0	5.8	1.87
240	12.1	19	68	116	128	96	95	116	99	81	109	48	18	4	3	6.9	2.09
270	9.9	17	55	106	136	124	129	139	91	68	70	38	20	6	1	6.6	2.00
300	6.5	22	66	123	157	125	116	117	85	56	69	39	19	5	4	6.2	1.77
330	6.9	23	76	153	160	135	132	113	79	53	46	19	6	2	2	5.7	1.88
Total	100.0	30	77	140	170	141	124	112	72	48	54	22	8	2	1	5.6	1.83

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.8	4.9	4.7	4.7	4.0	3.4	3.4	3.2	3.5	4.2	5.5	5.4	4.4
3	5.6	4.9	4.5	4.6	3.9	3.3	3.3	3.0	3.3	4.1	5.4	5.5	4.3
6	5.8	4.8	4.6	5.0	4.5	4.0	4.0	3.5	3.5	4.0	5.4	5.6	4.6
9	5.9	5.4	5.7	6.3	5.5	4.9	5.0	4.8	5.1	5.1	6.1	5.6	5.4
12	6.4	6.0	6.5	6.9	6.1	5.6	5.7	5.3	5.6	5.7	6.7	6.2	6.1
15	5.8	5.7	6.1	6.9	6.0	5.7	5.8	5.4	5.3	5.1	6.1	5.8	5.8
18	5.7	5.1	5.0	5.7	4.9	4.8	4.7	4.1	4.0	4.4	5.9	5.6	5.0
21	5.9	5.1	4.9	4.8	4.1	3.6	3.6	3.4	3.6	4.4	5.8	5.5	4.5
Day	5.9	5.3	5.3	5.6	4.9	4.4	4.4	4.1	4.2	4.6	5.8	5.6	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.8	7.6	8.2	7.5	6.8	7.0	7.7	8.0	9.0	9.0	8.6	8.3	8.0
	2.09	2.32	2.52	2.47	2.58	2.44	2.20	2.18	2.26	2.28	2.08	2.14	2.19
25	7.5	8.3	9.0	8.2	7.4	7.7	8.4	8.8	9.9	9.8	9.4	9.1	8.7
	2.16	2.39	2.60	2.55	2.66	2.51	2.26	2.25	2.31	2.33	2.12	2.20	2.25
50	8.1	8.9	9.6	8.8	7.9	8.2	9.0	9.4	10.5	10.5	10.1	9.7	9.4
	2.22	2.46	2.67	2.62	2.73	2.58	2.33	2.31	2.37	2.40	2.19	2.26	2.31
100	8.7	9.6	10.4	9.5	8.6	8.9	9.8	10.2	11.4	11.3	10.8	10.5	10.1
	2.15	2.38	2.58	2.53	2.65	2.50	2.25	2.24	2.31	2.34	2.13	2.20	2.26
200	9.6	10.7	11.6	10.6	9.5	9.9	10.8	11.3	12.4	12.4	11.8	11.5	11.2
	2.03	2.25	2.44	2.40	2.51	2.37	2.13	2.12	2.22	2.24	2.05	2.10	2.16
Freq	7.1	7.8	8.3	7.6	6.1	6.4	8.6	11.1	12.1	10.6	7.6	6.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	5.6	5.7	5.1	4.6	5.0	5.4	5.6	6.6	6.2	6.0	5.7	5.6
	1.72	2.05	2.11	2.10	2.14	2.05	1.79	1.85	2.03	1.96	1.74	1.86	1.87
25	5.3	6.7	6.8	6.1	5.5	6.0	6.4	6.8	7.8	7.4	7.2	6.8	6.7
	1.86	2.21	2.28	2.26	2.31	2.21	1.93	1.98	2.13	2.08	1.84	2.00	2.00
50	6.1	7.7	7.9	7.0	6.3	6.9	7.5	7.8	8.9	8.5	8.2	7.9	7.7
	2.09	2.48	2.57	2.55	2.60	2.48	2.17	2.21	2.31	2.28	1.99	2.23	2.21
100	7.3	9.2	9.3	8.3	7.5	8.2	8.9	9.2	10.3	9.9	9.5	9.3	9.0
	2.22	2.65	2.73	2.71	2.77	2.64	2.31	2.36	2.49	2.44	2.14	2.38	2.37
200	9.1	11.4	11.6	10.4	9.4	10.2	11.0	11.4	12.3	12.0	11.3	11.4	11.1
	2.12	2.53	2.61	2.59	2.64	2.53	2.20	2.26	2.39	2.34	2.06	2.28	2.29
Freq	7.3	7.8	8.5	7.2	5.7	6.6	9.2	11.7	12.1	10.1	6.8	6.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	5.0	5.0	4.4	4.0	4.4	4.7	4.9	5.8	5.4	5.3	4.9	4.9
	1.77	2.09	2.14	2.10	2.19	2.05	1.81	1.87	2.07	1.97	1.74	1.87	1.89
25	4.7	6.2	6.2	5.4	4.9	5.4	5.8	6.1	7.1	6.6	6.4	6.1	6.0
	1.89	2.24	2.29	2.25	2.34	2.20	1.93	1.99	2.17	2.08	1.82	1.99	2.00
50	5.5	7.2	7.2	6.3	5.8	6.4	6.9	7.2	8.3	7.7	7.4	7.1	7.0
	2.10	2.47	2.54	2.49	2.59	2.43	2.14	2.20	2.32	2.26	1.95	2.20	2.19
100	6.6	8.6	8.6	7.5	6.8	7.6	8.2	8.5	9.6	9.1	8.7	8.5	8.3
	2.30	2.72	2.79	2.73	2.85	2.67	2.35	2.41	2.55	2.48	2.13	2.42	2.40
200	8.1	10.6	10.6	9.3	8.5	9.4	10.1	10.4	11.5	11.0	10.4	10.4	10.2
	2.20	2.60	2.67	2.62	2.72	2.56	2.25	2.31	2.46	2.39	2.06	2.31	2.33
Freq	7.4	7.8	8.6	7.1	5.6	6.7	9.6	11.9	12.1	9.9	6.5	6.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.9	3.9	3.4	3.2	3.5	3.8	4.0	4.6	4.3	4.1	3.8	3.8
	1.81	2.10	2.13	2.11	2.15	1.99	1.83	1.88	2.07	1.96	1.75	1.83	1.89
25	4.1	5.2	5.1	4.5	4.2	4.6	4.9	5.2	6.0	5.6	5.4	4.9	5.1
	1.92	2.22	2.26	2.24	2.28	2.10	1.94	1.98	2.16	2.05	1.82	1.94	1.99
50	5.0	6.2	6.2	5.4	5.0	5.6	6.0	6.3	7.1	6.7	6.4	6.0	6.1
	2.09	2.42	2.45	2.43	2.48	2.29	2.11	2.13	2.29	2.19	1.94	2.10	2.14
100	6.0	7.5	7.4	6.5	6.1	6.7	7.2	7.5	8.4	7.9	7.6	7.2	7.3
	2.38	2.76	2.79	2.77	2.83	2.60	2.40	2.42	2.53	2.46	2.14	2.39	2.41
200	7.3	9.2	9.1	8.0	7.4	8.2	8.8	9.1	10.1	9.6	9.1	8.8	8.9
	2.30	2.65	2.69	2.67	2.72	2.51	2.32	2.34	2.50	2.40	2.11	2.31	2.36
Freq	7.4	7.9	8.4	6.9	5.8	7.1	9.9	11.9	11.8	9.4	6.6	7.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.1	381	5.0	153	4.3	101	3.4	49
25	7.7	487	5.9	242	5.3	177	4.5	105
50	8.3	588	6.8	336	6.2	260	5.4	171
100	9.0	760	8.0	518	7.4	400	6.5	269
200	9.9	1052	9.8	987	9.0	748	7.9	488

Terschelling

53° 21′ 00″ N 05° 11′ 00″ E	UTM 31 E 645333 m	N 5913553 m	1 m a.s.l.

Location in the north of the Netherlands on the SW point of the island of Terschelling. The anemometer is located on a wide open sand flat, with low dunes at a distance of 1 km to the NW-N, and the island itself to the N-ENE. In all other directions the sea lies at a distance of from 1 to 4 km. Note that the roughness of the sand flats is taken as identical to that of the open sea, in accordance with recent micro-meteorological evidence.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00	2000	0.01	4000	0.00								
30	0.00	1100	0.10	2500	0.20	6000	0.00						
60	0.00	1500	0.10										
90	0.00												
120	0.00												
150	0.00												
180	0.00												
210	0.00												
240	0.00												
270	0.00												
300	0.00												
330	0.00												

Height of anemometer: 10.0 m a.g.l. Period: 70010103-76123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.3	43	55	62	87	101	108	105	114	103	116	61	30	11	6	7.7	2.11
30	6.9	16	65	121	116	124	118	110	103	73	105	32	13	4	1	6.6	2.06
60	7.1	14	39	85	94	111	126	118	129	83	127	54	12	7	1	7.3	2.34
90	8.8	11	31	50	73	102	120	128	117	101	132	78	37	11	8	8.1	2.23
120	6.6	22	42	69	94	114	131	114	120	88	125	60	12	6	3	7.4	2.25
150	5.4	15	57	84	103	106	110	118	113	95	132	43	18	5	0	7.3	2.35
180	7.9	12	37	68	91	96	104	100	94	73	143	89	60	21	10	8.3	2.04
210	9.6	13	26	35	61	84	97	102	112	95	141	100	79	32	28	9.2	2.07
240	12.0	11	20	32	46	71	77	101	95	102	156	134	98	41	16	9.8	2.43
270	11.1	8	23	41	50	72	88	89	94	87	174	136	83	31	23	9.8	2.42
300	8.7	9	28	51	65	79	78	86	87	87	158	109	68	32	62	9.8	2.00
330	8.4	7	23	63	80	94	92	95	94	93	144	98	63	23	31	9.0	2.03
Total	100.0	14	35	59	76	93	101	104	104	90	140	89	53	21	17	8.5	2.06

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	8.7	7.4	7.4	7.0	6.7	5.6	6.2	5.9	6.8	7.8	9.3	9.1	7.3
3	8.8	7.4	7.4	7.1	7.0	5.7	6.1	5.9	6.7	7.4	9.4	9.0	7.3
6	8.7	7.4	7.5	7.3	7.0	5.9	6.2	5.8	6.8	7.5	9.4	9.0	7.4
9	8.6	7.6	7.8	7.9	7.0	6.2	6.8	6.4	7.4	7.7	9.6	9.1	7.7
12	8.6	7.5	8.0	8.0	7.3	6.5	7.1	6.7	7.5	7.7	9.7	9.2	7.8
15	8.6	7.4	7.9	8.3	7.8	7.0	7.5	6.8	7.6	7.7	9.2	9.1	7.9
18	8.4	7.3	7.3	7.8	7.4	6.5	7.0	6.4	7.0	7.3	9.4	9.1	7.6
21	8.7	7.5	7.4	7.1	6.6	5.7	6.2	5.9	6.9	7.8	9.5	9.1	7.4
Day	8.6	7.4	7.6	7.5	7.1	6.1	6.6	6.2	7.1	7.6	9.4	9.1	7.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	7.3	9.0	8.1	7.4	7.3	8.3	9.2	9.8	9.8	9.8	9.0	8.7
	2.10	2.05	2.77	2.23	2.25	2.34	2.04	2.07	2.43	2.42	2.01	2.02	2.13
25	8.6	8.0	9.8	8.8	8.1	7.9	9.0	10.0	10.7	10.7	10.7	9.8	9.5
	2.16	2.11	2.85	2.30	2.32	2.42	2.09	2.11	2.49	2.47	2.04	2.06	2.18
50	9.2	8.6	10.5	9.5	8.7	8.5	9.7	10.7	11.4	11.4	11.4	10.5	10.2
	2.22	2.16	2.93	2.36	2.38	2.48	2.15	2.17	2.55	2.54	2.09	2.12	2.24
100	10.0	9.3	11.4	10.3	9.4	9.3	10.5	11.5	12.3	12.3	12.2	11.3	11.0
	2.15	2.10	2.83	2.29	2.31	2.40	2.09	2.12	2.50	2.49	2.06	2.07	2.19
200	11.1	10.3	12.6	11.4	10.4	10.2	11.5	12.5	13.4	13.4	13.2	12.3	12.1
	2.03	1.98	2.69	2.17	2.19	2.28	1.99	2.05	2.40	2.39	1.99	1.99	2.12
Freq	7.3	6.9	7.1	8.8	6.7	5.4	7.8	9.6	11.9	11.1	8.8	8.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	5.2	6.2	5.6	5.1	5.2	6.0	6.6	6.9	6.9	6.8	6.1	6.1
	1.74	1.74	2.30	1.87	1.89	1.83	1.76	1.89	2.13	2.05	1.78	1.74	1.85
25	6.4	6.3	7.5	6.7	6.2	6.3	7.1	7.8	8.2	8.2	8.1	7.3	7.3
	1.88	1.88	2.49	2.02	2.05	1.98	1.87	1.99	2.25	2.15	1.85	1.83	1.96
50	7.4	7.3	8.6	7.7	7.1	7.3	8.2	8.9	9.4	9.3	9.1	8.3	8.4
	2.12	2.12	2.80	2.27	2.30	2.22	2.05	2.15	2.44	2.32	1.97	1.99	2.14
100	8.8	8.6	10.2	9.1	8.4	8.6	9.5	10.3	10.8	10.7	10.4	9.7	9.8
	2.25	2.25	2.98	2.41	2.45	2.36	2.20	2.31	2.62	2.49	2.12	2.14	2.31
200	11.0	10.7	12.7	11.4	10.5	10.7	11.6	12.2	12.9	12.8	12.2	11.6	11.8
	2.15	2.15	2.85	2.31	2.33	2.26	2.11	2.23	2.52	2.40	2.05	2.06	2.25
Freq	7.2	6.9	7.5	8.4	6.3	5.9	8.3	10.1	11.8	10.6	8.7	8.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.6	5.4	4.8	4.5	4.6	5.3	5.8	6.1	6.1	5.9	5.3	5.3
	1.74	1.77	2.31	1.87	1.89	1.80	1.77	1.93	2.13	2.03	1.77	1.74	1.85
25	5.7	5.7	6.7	5.9	5.5	5.7	6.5	7.1	7.4	7.4	7.2	6.5	6.6
	1.87	1.90	2.47	2.00	2.03	1.92	1.87	2.02	2.23	2.12	1.84	1.82	1.95
50	6.7	6.7	7.8	7.0	6.5	6.7	7.5	8.2	8.5	8.5	8.3	7.5	7.6
	2.06	2.10	2.73	2.21	2.24	2.13	2.02	2.16	2.39	2.26	1.94	1.96	2.11
100	8.0	8.0	9.3	8.3	7.7	8.0	8.8	9.5	9.9	9.9	9.6	8.8	9.0
	2.27	2.31	3.00	2.43	2.47	2.34	2.22	2.37	2.62	2.47	2.12	2.16	2.32
200	9.9	9.9	11.5	10.3	9.5	9.9	10.6	11.4	11.8	11.7	11.2	10.6	10.8
	2.17	2.21	2.87	2.33	2.36	2.24	2.14	2.29	2.53	2.39	2.06	2.08	2.26
Freq	7.2	6.9	7.7	8.2	6.2	6.2	8.4	10.3	11.8	10.4	8.6	8.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.7	4.2	3.8	3.5	3.7	4.2	4.6	4.8	4.8	4.6	4.1	4.2
	1.73	1.80	2.30	1.87	1.91	1.77	1.79	1.99	2.15	1.99	1.78	1.73	1.86
25	4.8	4.9	5.6	4.9	4.6	4.9	5.5	6.0	6.2	6.2	6.0	5.3	5.5
	1.84	1.91	2.44	1.99	2.02	1.88	1.87	2.06	2.24	2.07	1.84	1.80	1.95
50	5.8	5.9	6.7	6.0	5.6	5.9	6.6	7.2	7.4	7.4	7.1	6.4	6.6
	1.99	2.07	2.65	2.15	2.20	2.04	1.99	2.18	2.37	2.17	1.92	1.92	2.07
100	7.0	7.1	8.1	7.2	6.8	7.1	7.8	8.5	8.8	8.7	8.4	7.7	7.9
	2.27	2.36	3.02	2.45	2.50	2.32	2.22	2.40	2.61	2.37	2.08	2.14	2.31
200	8.5	8.7	9.9	8.8	8.3	8.7	9.4	10.1	10.5	10.4	9.9	9.2	9.5
	2.19	2.28	2.91	2.37	2.41	2.24	2.18	2.38	2.58	2.37	2.09	2.10	2.29
Freq	7.1	6.9	7.9	7.9	6.1	6.5	8.6	10.6	11.6	10.1	8.6	8.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.7	508	5.4	205	4.7	135	3.7	65
25	8.4	649	6.5	323	5.8	236	4.9	140
50	9.0	780	7.4	445	6.8	344	5.9	227
100	9.8	997	8.6	664	8.0	514	7.0	352
200	10.7	1352	10.5	1210	9.6	922	8.4	617

Texel Lichtschip

53° 01′ 00″ N 04° 22′ 00″ E	UTM 31 E 591684 m	N 5875122 m	0 m a.s.l.

The lightvessel was situated in the North Sea, 30 km from the head of N Holland, near the island of Texel. The wind data are based on the Beaufort scale, estimated by observation of the sea state.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.00												
30	0.00												
60	0.00												
90	0.00												
120	0.00												
150	0.00												
180	0.00												
210	0.00												
240	0.00												
270	0.00												
300	0.00												
330	0.00												

Height of anemometer: 20.0 m a.g.l. Period: 70010103–76123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.9	86	85	44	59	81	91	117	112	88	119	64	27	18	11	7.8	2.01
30	7.6	22	21	49	72	119	126	144	139	122	124	35	19	6	4	7.7	2.54
60	7.2	27	20	36	65	115	139	164	137	109	96	56	21	9	7	7.7	2.24
90	8.3	23	19	45	81	121	133	154	142	100	101	40	22	13	7	7.6	2.23
120	5.9	30	31	54	63	132	143	142	130	105	98	40	20	8	4	7.4	2.30
150	5.3	34	19	47	93	131	129	157	130	93	109	33	8	12	7	7.3	2.31
180	7.4	25	26	49	67	109	111	107	111	109	128	76	48	20	13	8.3	2.11
210	11.1	17	10	27	51	83	91	119	127	112	137	91	64	37	33	9.1	1.97
240	11.9	14	12	24	48	70	80	124	119	115	144	105	77	39	27	9.4	2.09
270	11.4	18	13	31	49	78	86	113	97	102	161	113	70	32	34	9.6	2.19
300	8.3	21	16	33	48	75	85	100	106	104	158	86	66	28	76	9.7	1.81
330	7.7	19	21	30	46	82	99	104	104	121	150	99	58	26	40	9.4	2.01
Total	100.0	27	23	37	60	96	105	127	120	107	131	75	46	23	24	8.5	1.99

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	9.0	7.8	7.4	7.2	6.2	5.8	6.4	6.3	7.4	8.6	10.1	9.6	7.7
3	9.3	8.0	7.6	7.3	6.7	5.8	6.6	6.3	7.4	8.5	10.2	9.6	7.8
6	9.3	7.8	7.4	7.4	6.5	6.0	6.5	6.2	7.2	8.2	10.2	9.7	7.7
9	8.7	7.7	7.6	7.3	6.3	6.0	6.5	6.2	7.4	8.1	10.0	9.5	7.6
12	8.9	7.7	7.5	7.2	6.3	5.9	6.6	6.0	7.3	8.1	10.0	9.5	7.6
15	8.8	7.5	7.4	7.4	6.7	5.9	7.0	6.0	7.3	8.1	10.1	9.3	7.6
18	8.7	7.3	7.2	7.5	6.4	6.2	6.8	6.2	7.4	8.2	10.1	9.5	7.6
21	8.8	7.5	7.4	7.1	6.0	5.8	6.4	6.2	7.3	8.4	10.2	9.5	7.5
Day	8.9	7.7	7.5	7.3	6.4	5.9	6.6	6.2	7.3	8.3	10.1	9.5	7.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.3	7.2	7.2	7.1	6.9	6.9	7.8	8.6	8.8	8.9	9.1	8.7	8.0
	1.96	2.47	2.21	2.19	2.24	2.24	2.06	1.94	2.07	2.15	1.81	1.97	1.98
25	7.9	7.8	7.9	7.8	7.6	7.5	8.5	9.4	9.6	9.8	9.9	9.5	8.8
	2.03	2.55	2.28	2.25	2.31	2.31	2.12	1.99	2.12	2.20	1.83	2.01	2.03
50	8.5	8.4	8.4	8.3	8.1	8.1	9.2	10.0	10.3	10.4	10.6	10.2	9.4
	2.08	2.62	2.35	2.31	2.38	2.38	2.18	2.05	2.18	2.26	1.88	2.07	2.08
100	9.2	9.1	9.2	9.1	8.8	8.8	9.9	10.8	11.1	11.3	11.4	11.0	10.1
	2.01	2.54	2.27	2.24	2.30	2.30	2.11	1.99	2.13	2.20	1.85	2.02	2.04
200	10.2	10.1	10.1	10.0	9.7	9.7	11.0	11.8	12.1	12.3	12.3	12.0	11.1
	1.90	2.40	2.15	2.12	2.18	2.18	2.00	1.92	2.04	2.11	1.79	1.94	1.96
Freq	7.9	7.6	7.2	8.3	5.9	5.3	7.4	11.1	11.9	11.4	8.3	7.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	5.0	5.0	4.9	4.8	4.9	5.6	6.1	6.2	6.3	6.4	5.8	5.6
	1.71	2.01	1.82	1.82	1.87	1.76	1.72	1.71	1.81	1.81	1.63	1.67	1.71
25	6.0	6.0	5.9	5.9	5.8	5.9	6.7	7.2	7.4	7.5	7.6	7.0	6.7
	1.85	2.17	1.97	1.97	2.02	1.90	1.84	1.81	1.92	1.92	1.71	1.77	1.81
50	7.0	6.9	6.9	6.8	6.7	6.8	7.8	8.2	8.5	8.6	8.6	8.0	7.7
	2.07	2.44	2.21	2.21	2.27	2.13	2.06	1.97	2.09	2.08	1.82	1.95	1.99
100	8.3	8.2	8.2	8.1	7.9	8.1	9.2	9.6	9.8	9.9	9.8	9.3	9.0
	2.20	2.60	2.35	2.35	2.42	2.27	2.20	2.11	2.24	2.23	1.95	2.09	2.15
200	10.4	10.2	10.2	10.1	9.9	10.1	11.3	11.5	11.9	11.9	11.5	11.3	11.0
	2.11	2.48	2.25	2.25	2.31	2.17	2.10	2.03	2.16	2.15	1.89	2.01	2.08
Freq	7.8	7.5	7.5	7.7	5.8	5.8	8.3	11.3	11.8	10.6	8.2	7.8	100.0

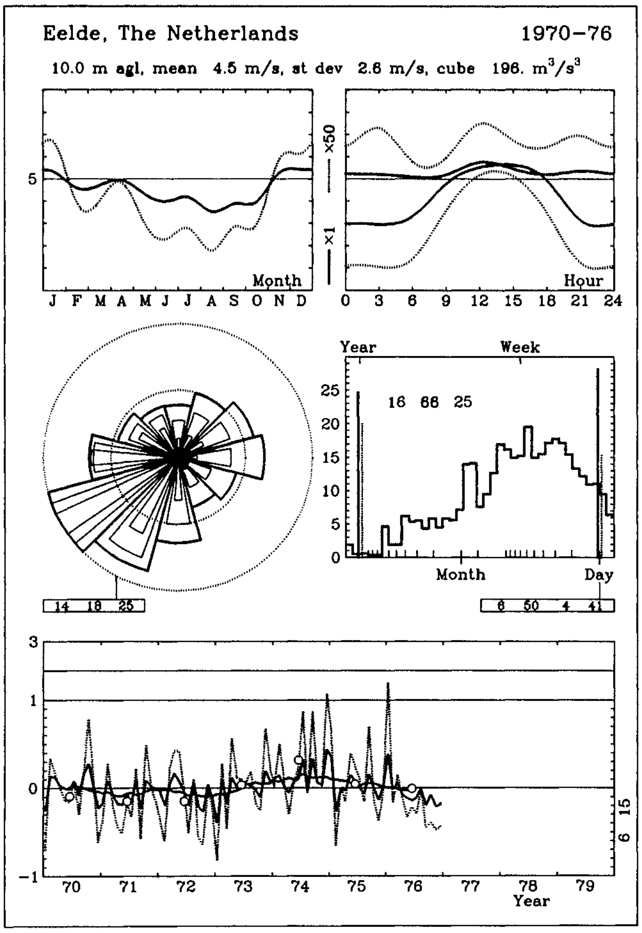
Roughness Class 2

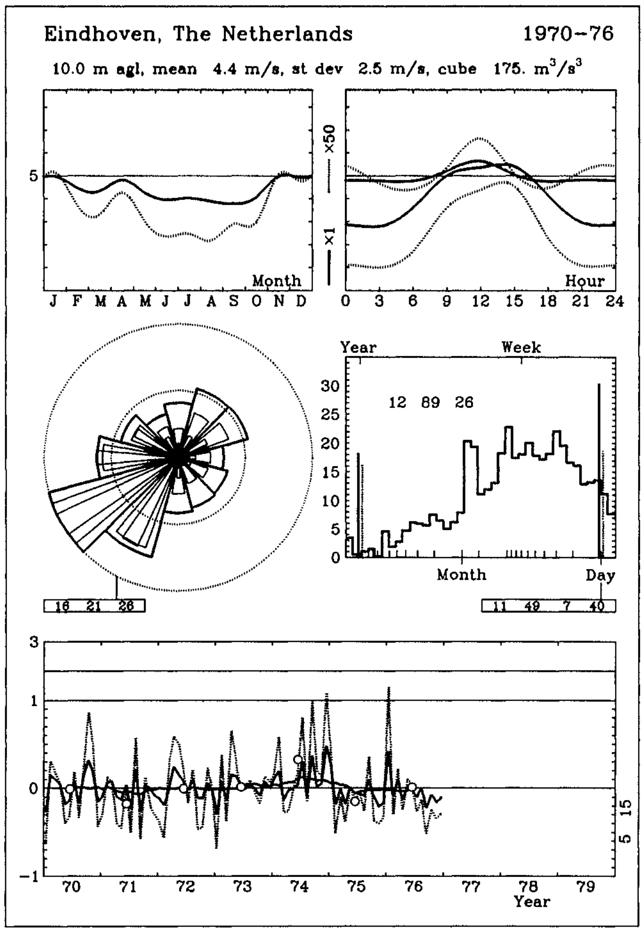
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.4	4.3	4.3	4.2	4.4	4.9	5.3	5.5	5.6	5.6	5.0	4.9
	1.76	2.01	1.85	1.85	1.88	1.77	1.71	1.75	1.84	1.81	1.66	1.66	1.72
25	5.5	5.4	5.4	5.3	5.2	5.4	6.1	6.5	6.7	6.8	6.8	6.2	6.0
	1.88	2.15	1.99	1.98	2.01	1.89	1.82	1.84	1.94	1.90	1.73	1.76	1.82
50	6.4	6.3	6.3	6.2	6.1	6.3	7.1	7.6	7.8	7.9	7.9	7.2	7.0
	2.08	2.38	2.20	2.19	2.23	2.09	1.99	1.98	2.09	2.04	1.83	1.90	1.97
100	7.7	7.5	7.5	7.4	7.3	7.6	8.4	8.9	9.1	9.2	9.1	8.5	8.3
	2.29	2.62	2.42	2.40	2.45	2.30	2.19	2.18	2.30	2.24	1.99	2.10	2.18
200	9.4	9.3	9.3	9.2	9.0	9.3	10.3	10.7	10.9	11.0	10.7	10.2	10.1
	2.19	2.50	2.31	2.30	2.34	2.20	2.10	2.10	2.22	2.16	1.94	2.01	2.12
Freq	7.7	7.5	7.6	7.5	5.7	6.0	8.6	11.4	11.7	10.4	8.1	7.9	100.0

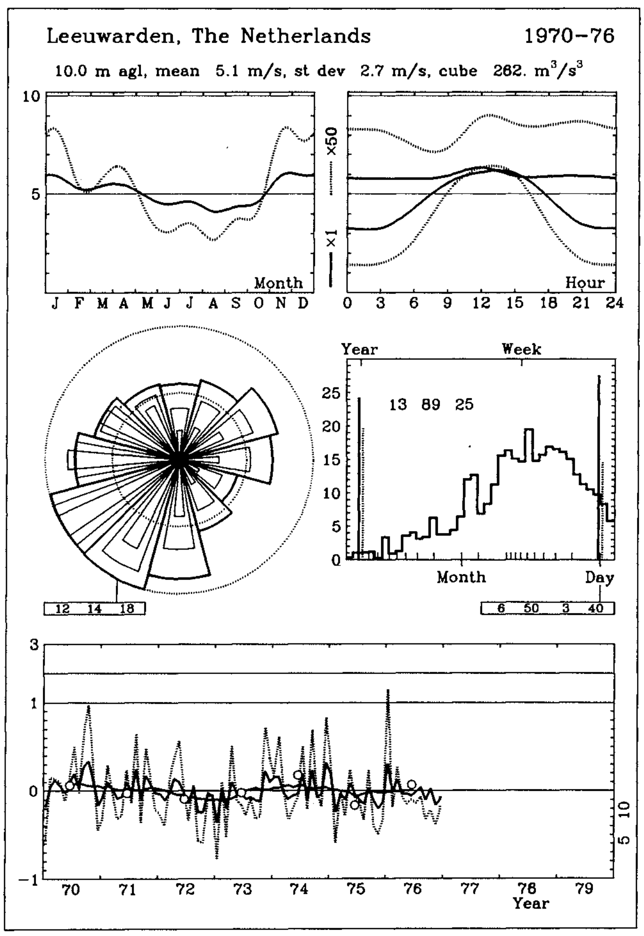
Roughness Class 3

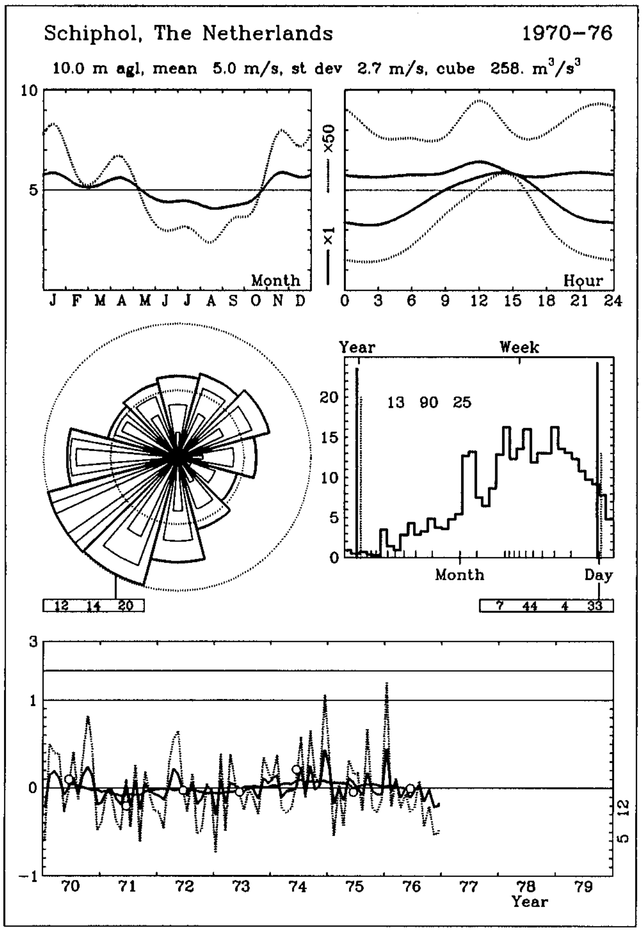
z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.5	3.4	3.4	3.3	3.5	3.9	4.2	4.3	4.4	4.4	3.8	3.9
	1.81	1.99	1.88	1.87	1.90	1.75	1.71	1.76	1.86	1.81	1.68	1.63	1.73
25	4.6	4.6	4.5	4.5	4.4	4.6	5.2	5.5	5.6	5.7	5.7	5.0	5.1
	1.92	2.12	1.99	1.98	2.02	1.85	1.79	1.84	1.94	1.88	1.74	1.72	1.81
50	5.6	5.5	5.5	5.4	5.3	5.6	6.2	6.6	6.7	6.9	6.8	6.1	6.1
	2.08	2.30	2.16	2.15	2.19	2.01	1.93	1.96	2.06	1.98	1.83	1.85	1.94
100	6.7	6.6	6.6	6.5	6.4	6.7	7.4	7.8	8.0	8.1	8.1	7.3	7.3
	2.37	2.62	2.46	2.45	2.49	2.30	2.18	2.17	2.30	2.18	1.99	2.08	2.17
200	8.2	8.1	8.1	8.0	7.8	8.2	9.0	9.4	9.6	9.7	9.5	8.8	8.8
	2.29	2.52	2.37	2.36	2.40	2.21	2.11	2.13	2.26	2.16	1.99	2.02	2.14
Freq	7.6	7.4	7.7	7.2	5.6	6.3	9.0	11.4	11.7	9.9	8.0	8.0	100.0

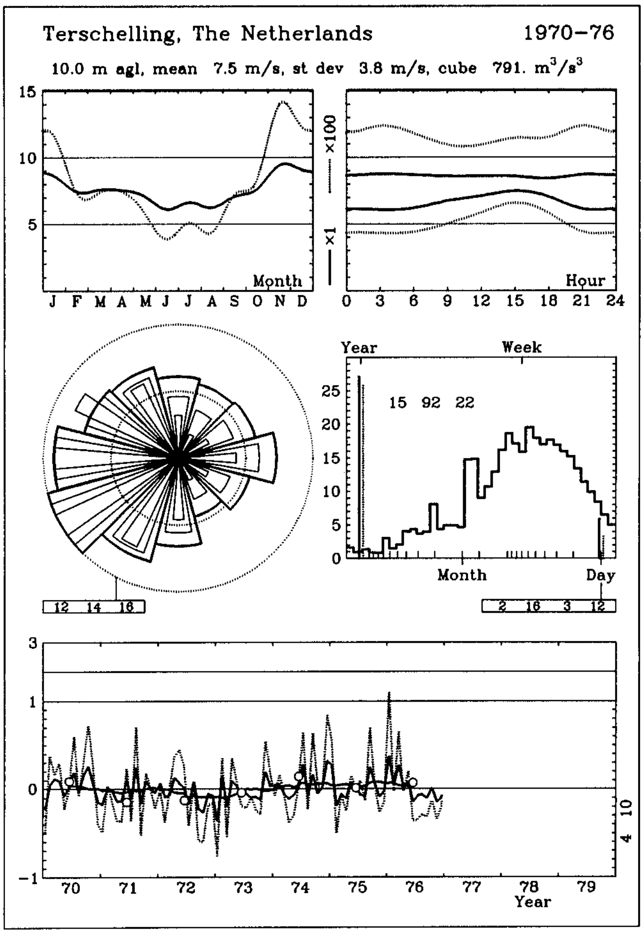
z	Class 0		Class 1		Class 2		Class 3	
10	7.1	424	5.0	174	4.4	114	3.4	55
25	7.8	541	5.9	272	5.4	199	4.5	119
50	8.3	648	6.8	372	6.2	288	5.4	191
100	9.0	834	8.0	558	7.4	431	6.5	293
200	9.9	1143	9.7	1037	8.9	787	7.8	522

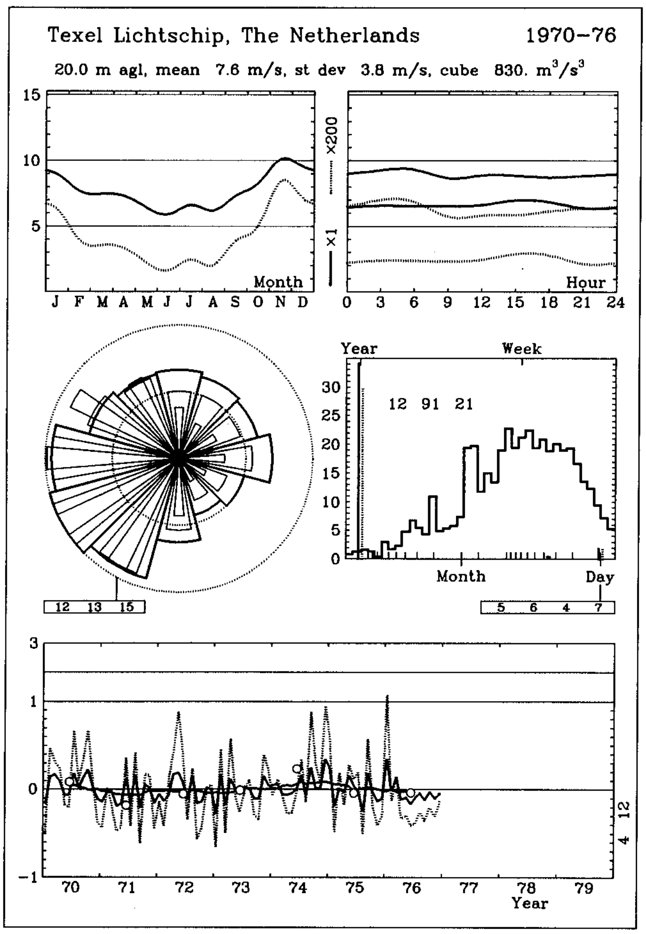

Eelde, The Netherlands 1970–76
10.0 m agl, mean 4.5 m/s, st dev 2.6 m/s, cube 196. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
16 66 25
Month
Day
14 18 25
6 50 4 41
70 71 72 73 74 75 76 77 78 79
Year


Eindhoven, The Netherlands 1970–76
10.0 m agl, mean 4.4 m/s, st dev 2.5 m/s, cube 175. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
12 89 26
Month
Day
16 21 26
11 49 7 40
70 71 72 73 74 75 76 77 78 79
Year


Leeuwarden, The Netherlands 1970–76
10.0 m agl, mean 5.1 m/s, st dev 2.7 m/s, cube 262. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year
Week
13 89 25
Month
Day
12 14 18
6 50 3 40
70 71 72 73 74 75 76 77 78 79
Year


Schiphol, The Netherlands 1970–76
10.0 m agl, mean 5.0 m/s, st dev 2.7 m/s, cube 258. m³/s³
×50
×1
Month
J F M A M J J A S O N D
Hour
0 3 6 9 12 15 18 21 24
Year
Week
13 90 25
Month
Day
12 14 20
7 44 4 33
5 12
70 71 72 73 74 75 76 77 78 79
Year


Terschelling, The Netherlands 1970–76
10.0 m agl, mean 7.5 m/s, st dev 3.8 m/s, cube 791. m³/s³
×100
×1
Month
J F M A M J J A S O N D
Hour
0 3 6 9 12 15 18 21 24
Year
Week
15 92 22
Month
Day
12 14 16
2 16 3 12
4 10
70 71 72 73 74 75 76 77 78 79
Year


Texel Lichtschip, The Netherlands 1970–76
20.0 m agl, mean 7.6 m/s, st dev 3.8 m/s, cube 830. m³/s³
×200
×1
Month
J F M A M J J A S O N D
Hour
0 3 6 9 12 15 18 21 24
Year
Week
12 91 21
Month
Day
12 13 15
5 6 4 7
4 12
70 71 72 73 74 75 76 77 78 79
Year

Beja

38° 01′ 00″ N	07° 52′ 00″ W	UTM 29	E 599487 m	N 4208340 m	246 m a.s.l.

Location 1.5 km N of the city centre of Beja. The terrain is flat and characterized by small houses, shelterbelts and rows of trees. The anemometer is located 4 m above a 6-m high building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10											12	2
30	0.30	600	0.10									20	5
60	0.30	600	0.10									27	2
90	0.30	1000	0.10									28	-2
120	0.30	1000	0.10									20	-5
150	0.30	2000	0.10									12	-3
180	0.01	300	0.30	2000	0.10							13	2
210	0.01	500	0.30	2000	0.10							19	4
240	0.01	500	0.05									24	2
270	0.01	500	0.05									24	-2
300	0.01	500	0.05									19	-4
330	0.01	500	0.05									13	-2

Height of anemometer: 10.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.2	48	233	243	201	114	85	39	19	11	6	0	0	0	0	3.6	1.77
30	4.9	34	238	281	197	95	80	40	18	8	8	1	0	0	0	3.4	1.65
60	5.4	25	224	292	206	106	67	46	21	8	4	4	0	0	0	3.5	1.65
90	6.1	27	177	322	256	98	63	25	17	9	5	0	0	0	0	3.5	1.86
120	5.3	9	157	223	252	139	95	73	33	11	8	0	1	0	0	4.1	1.91
150	5.0	14	125	181	226	152	117	94	47	26	17	2	0	0	0	4.5	1.95
180	5.7	19	124	148	223	179	163	79	35	19	9	2	0	0	0	4.6	2.30
210	5.7	16	110	158	208	170	138	98	48	25	25	4	1	0	0	4.8	2.06
240	12.7	20	113	177	203	157	110	89	57	37	28	7	2	0	0	4.8	1.85
270	21.0	20	114	174	197	166	135	102	48	23	15	6	1	0	0	4.8	2.08
300	14.0	16	116	160	219	162	143	104	44	19	15	2	0	0	0	4.7	2.18
330	8.0	26	152	188	197	146	136	87	37	20	9	1	0	0	0	4.4	2.04
Total	100.0	22	144	199	212	147	118	81	40	20	14	3	1	0	0	4.3	1.88

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.8	4.0	3.8	3.6	3.9	3.9	4.1	4.0	3.5	3.5	3.2	3.7	3.8
3	3.6	3.8	3.4	3.3	3.4	3.3	3.1	3.1	2.5	3.2	3.1	3.6	3.3
6	3.8	3.9	3.5	3.3	3.2	3.0	3.0	3.0	2.6	3.3	3.4	3.9	3.3
9	3.7	4.1	3.6	3.8	3.9	3.5	3.4	3.1	2.8	3.5	3.3	3.7	3.5
12	4.6	5.2	4.9	4.5	4.5	3.8	3.8	3.7	3.5	4.5	4.3	4.6	4.3
15	4.8	5.5	5.0	5.1	4.9	4.2	4.2	3.9	3.8	4.6	4.2	4.8	4.5
18	3.9	4.4	4.7	4.8	5.3	5.5	5.5	5.5	4.8	4.2	3.4	3.8	4.6
21	3.8	4.2	3.9	3.9	4.3	4.6	5.0	5.1	4.4	3.8	3.3	3.7	4.2
Day	4.0	4.4	4.2	4.1	4.2	4.0	4.0	4.0	3.5	3.8	3.5	4.0	4.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.2	5.1	4.9	5.7	7.1	6.9	6.3	5.6	5.4	5.5	5.6	5.7
	2.22	2.00	1.95	2.11	2.14	2.18	2.53	2.49	2.24	2.41	2.55	2.53	2.24
25	5.9	5.7	5.5	5.4	6.3	7.8	7.6	6.9	6.2	5.9	6.0	6.1	6.2
	2.29	2.06	2.01	2.17	2.21	2.25	2.61	2.56	2.31	2.49	2.63	2.61	2.31
50	6.3	6.2	5.9	5.8	6.7	8.4	8.1	7.4	6.6	6.4	6.5	6.6	6.7
	2.35	2.12	2.07	2.23	2.27	2.31	2.67	2.63	2.37	2.55	2.70	2.68	2.37
100	6.9	6.7	6.4	6.3	7.3	9.1	8.8	8.0	7.2	6.9	7.0	7.1	7.2
	2.28	2.05	2.00	2.16	2.20	2.24	2.59	2.55	2.30	2.47	2.62	2.60	2.30
200	7.6	7.4	7.1	7.0	8.1	10.0	9.8	8.9	7.9	7.7	7.8	7.9	8.0
	2.15	1.94	1.90	2.05	2.08	2.12	2.45	2.41	2.17	2.34	2.47	2.45	2.18
Freq	7.5	5.6	4.8	5.2	5.4	5.6	6.1	6.4	9.9	16.7	15.9	10.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.7	3.5	3.5	4.2	5.2	4.7	4.3	3.8	3.8	3.9	4.0	4.0
	1.77	1.66	1.65	1.84	1.83	1.94	2.21	2.03	1.87	2.07	2.20	2.12	1.91
25	4.4	4.4	4.2	4.1	5.0	6.3	5.6	5.2	4.6	4.5	4.7	4.7	4.8
	1.91	1.79	1.78	1.99	1.98	2.09	2.39	2.19	2.02	2.24	2.37	2.30	2.06
50	5.1	5.1	4.8	4.8	5.8	7.3	6.4	5.9	5.3	5.2	5.4	5.5	5.5
	2.15	2.01	2.00	2.23	2.22	2.35	2.69	2.46	2.27	2.52	2.67	2.58	2.30
100	6.1	6.1	5.7	5.7	6.9	8.6	7.6	7.1	6.3	6.2	6.4	6.5	6.5
	2.28	2.14	2.13	2.38	2.37	2.50	2.86	2.62	2.42	2.68	2.84	2.74	2.44
200	7.6	7.6	7.1	7.1	8.6	10.7	9.5	8.8	7.9	7.7	8.0	8.1	8.1
	2.18	2.05	2.03	2.27	2.26	2.39	2.73	2.50	2.31	2.56	2.71	2.62	2.33
Freq	6.8	5.1	4.8	5.3	5.3	5.6	6.3	6.4	11.3	18.6	14.7	9.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.2	3.0	3.0	3.8	4.6	4.0	3.7	3.3	3.3	3.4	3.4	3.5
	1.74	1.63	1.68	1.86	1.93	1.93	2.30	2.01	1.83	2.06	2.13	2.04	1.90
25	4.0	3.9	3.8	3.8	4.7	5.7	5.0	4.6	4.1	4.1	4.2	4.2	4.3
	1.86	1.74	1.80	1.99	2.06	2.06	2.46	2.15	1.96	2.21	2.28	2.18	2.02
50	4.7	4.6	4.4	4.4	5.5	6.7	5.8	5.4	4.8	4.8	4.9	4.9	5.0
	2.06	1.93	1.99	2.20	2.29	2.29	2.73	2.37	2.17	2.45	2.53	2.42	2.23
100	5.6	5.5	5.3	5.3	6.5	7.9	6.9	6.4	5.7	5.7	5.9	5.9	6.0
	2.26	2.12	2.19	2.42	2.51	2.51	3.00	2.61	2.38	2.69	2.78	2.65	2.44
200	6.8	6.8	6.5	6.5	8.0	9.8	8.6	7.9	7.1	7.0	7.2	7.3	7.4
	2.16	2.03	2.09	2.31	2.40	2.40	2.87	2.50	2.28	2.57	2.66	2.54	2.34
Freq	6.7	5.0	4.8	5.3	5.3	5.7	6.4	6.6	11.8	18.9	14.3	9.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.5	2.4	2.5	3.0	3.6	3.1	2.9	2.6	2.6	2.7	2.7	2.8
	1.78	1.71	1.72	1.90	1.88	1.98	2.24	2.01	1.95	2.13	2.25	2.09	1.95
25	3.4	3.3	3.2	3.3	4.0	4.7	4.1	3.8	3.5	3.5	3.6	3.6	3.6
	1.89	1.81	1.82	2.02	1.99	2.10	2.38	2.13	2.06	2.26	2.38	2.22	2.06
50	4.1	4.1	3.8	4.0	4.8	5.7	5.0	4.6	4.2	4.2	4.3	4.3	4.4
	2.05	1.97	1.98	2.19	2.16	2.28	2.59	2.31	2.24	2.45	2.59	2.41	2.24
100	4.9	4.9	4.7	4.8	5.8	6.8	6.0	5.5	5.1	5.0	5.2	5.2	5.3
	2.34	2.24	2.25	2.50	2.46	2.60	2.95	2.63	2.56	2.80	2.95	2.75	2.53
200	6.0	6.0	5.7	5.8	7.1	8.4	7.3	6.7	6.2	6.2	6.4	6.4	6.5
	2.25	2.16	2.17	2.40	2.37	2.50	2.84	2.54	2.46	2.69	2.85	2.65	2.44
Freq	6.5	5.0	4.8	5.3	5.3	5.8	6.4	7.3	12.8	18.2	13.6	8.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.0	134	3.5	53	3.1	35	2.4	17
25	5.5	172	4.2	85	3.8	63	3.2	37
50	5.9	209	4.9	120	4.4	93	3.9	61
100	6.4	272	5.8	192	5.3	147	4.7	98
200	7.1	385	7.2	382	6.5	284	5.7	184

Bragança

41° 48′ 00″ N	06° 44′ 00″ W	UTM 29	E 688320 m	N 4630136 m	691 m a.s.l.

The station is surrounded by hills and mountains in all directions. The landscape is further characterized by forests and numerous villages. The anemometer is located 5.5 m above the roof of a 3.6-m high weather station. Various houses in the vicinity of the station do not appear to obstruct the air flow around the anemometer seriously.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30											129	-9
30	0.30											82	-20
60	0.30											24	-13
90	0.30											29	15
120	0.30											90	19
150	0.30											132	7
180	0.30											129	-9
210	0.30											82	-20
240	0.30											24	-13
270	0.40											31	16
300	0.40											96	20
330	0.30											132	7

Height of anemometer: 9.1 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	7.1	305	345	170	84	38	18	13	11	4	6	3	1	0	0	1.9	1.03
30	6.8	278	342	180	118	40	24	9	5	4	1	0	0	0	0	2.1	1.29
60	4.2	312	300	156	114	63	31	14	4	3	2	1	0	0	0	2.1	1.21
90	4.9	301	313	192	107	46	21	13	4	0	2	0	0	0	0	2.1	1.32
120	5.7	293	298	200	116	52	26	8	5	1	1	1	0	1	0	2.2	1.27
150	9.0	257	261	189	139	66	45	26	11	3	3	0	0	0	0	2.6	1.39
180	8.9	242	257	163	120	78	62	32	18	14	8	5	1	0	0	2.8	1.23
210	5.7	286	243	150	140	80	36	31	19	5	7	4	0	0	0	2.6	1.25
240	7.2	246	186	139	138	96	76	52	25	17	19	2	3	1	0	3.4	1.34
270	17.6	179	172	144	153	121	101	62	30	17	14	5	2	0	0	3.9	1.59
300	16.0	159	145	92	106	99	117	92	65	47	48	18	7	3	2	5.1	1.61
330	6.8	254	258	121	69	36	49	46	40	41	51	21	11	1	0	3.1	0.99
Total	100.0	238	237	150	120	77	64	43	26	17	17	6	3	1	0	3.0	1.18

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.5	2.8	2.8	2.6	2.7	2.3	2.7	2.6	2.1	2.0	2.0	2.1	2.4
3	2.3	2.8	2.6	2.2	2.3	1.9	2.1	1.7	1.8	2.1	1.8	2.2	2.1
6	2.5	2.6	2.4	1.9	2.0	1.5	1.5	1.5	1.5	1.7	1.8	2.2	1.9
9	2.4	2.5	2.9	2.5	2.5	2.3	2.1	1.8	1.6	1.8	1.8	2.1	2.2
12	3.0	3.6	4.1	3.9	3.9	3.5	3.4	3.1	2.8	3.2	3.0	2.8	3.3
15	3.8	4.4	5.0	4.6	4.5	3.9	4.0	4.1	3.8	3.8	3.6	3.3	4.1
18	3.0	3.7	4.4	4.6	4.5	4.2	4.3	4.5	3.4	2.9	2.8	2.6	3.7
21	2.6	3.2	3.1	3.3	3.4	3.3	3.6	3.6	2.8	2.4	2.4	2.4	3.0
Day	2.8	3.2	3.4	3.2	3.2	2.9	3.0	2.9	2.5	2.5	2.4	2.5	2.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.1	2.2	3.0	3.5	3.1	2.4	2.4	2.9	4.6	6.8	6.3	4.2	4.3
	1.07	1.29	1.37	1.50	1.56	1.58	1.48	1.43	1.40	1.70	1.70	1.44	1.28
25	2.3	2.4	3.3	3.8	3.4	2.6	2.6	3.2	5.1	7.5	6.9	4.7	4.7
	1.10	1.33	1.41	1.55	1.61	1.63	1.53	1.48	1.45	1.75	1.76	1.49	1.31
50	2.5	2.6	3.6	4.1	3.6	2.8	2.8	3.5	5.5	8.0	7.5	5.0	5.1
	1.13	1.37	1.45	1.59	1.65	1.67	1.57	1.51	1.48	1.79	1.80	1.52	1.33
100	2.7	2.8	3.9	4.4	3.9	3.1	3.1	3.8	5.9	8.7	8.1	5.4	5.5
	1.10	1.32	1.40	1.54	1.60	1.62	1.52	1.47	1.44	1.75	1.74	1.48	1.30
200	3.0	3.1	4.2	4.9	4.3	3.4	3.4	4.1	6.5	9.5	8.9	5.9	6.0
	1.04	1.26	1.33	1.46	1.51	1.54	1.44	1.39	1.37	1.67	1.65	1.40	1.26
Freq	3.7	5.2	7.1	8.0	7.3	5.7	5.0	5.9	8.9	19.0	17.9	6.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.4	1.7	2.3	2.4	2.0	1.7	1.8	2.1	3.5	4.8	4.0	2.5	3.0
	1.02	1.23	1.23	1.30	1.32	1.42	1.28	1.23	1.26	1.49	1.40	1.12	1.15
25	1.8	2.0	2.8	2.9	2.4	2.0	2.1	2.5	4.2	5.8	4.8	3.0	3.6
	1.10	1.32	1.33	1.40	1.42	1.52	1.38	1.31	1.36	1.59	1.51	1.21	1.21
50	2.1	2.4	3.3	3.4	2.8	2.4	2.5	3.0	5.0	6.7	5.7	3.6	4.2
	1.23	1.48	1.48	1.57	1.59	1.71	1.54	1.48	1.52	1.76	1.70	1.35	1.31
100	2.5	2.9	4.0	4.1	3.3	2.8	3.0	3.6	5.9	7.9	6.8	4.3	5.1
	1.30	1.57	1.58	1.67	1.69	1.82	1.64	1.56	1.62	1.88	1.80	1.43	1.38
200	3.1	3.6	4.9	5.1	4.1	3.5	3.7	4.4	7.4	9.7	8.4	5.3	6.2
	1.25	1.51	1.51	1.60	1.62	1.74	1.57	1.50	1.55	1.80	1.73	1.37	1.34
Freq	3.9	5.8	7.4	8.0	6.9	5.3	5.0	6.3	9.9	22.6	13.9	4.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.2	1.5	2.0	2.1	1.7	1.4	1.6	1.9	3.1	4.2	3.4	1.9	2.6
	1.01	1.25	1.23	1.30	1.36	1.40	1.27	1.26	1.30	1.50	1.40	1.05	1.15
25	1.5	1.9	2.5	2.6	2.1	1.8	2.0	2.4	3.9	5.2	4.2	2.4	3.2
	1.08	1.33	1.31	1.38	1.45	1.50	1.36	1.34	1.39	1.59	1.50	1.12	1.21
50	1.8	2.2	3.0	3.1	2.5	2.1	2.3	2.8	4.7	6.1	5.0	2.9	3.8
	1.18	1.47	1.45	1.53	1.60	1.66	1.50	1.48	1.53	1.74	1.65	1.23	1.29
100	2.2	2.7	3.7	3.7	3.0	2.5	2.8	3.4	5.6	7.3	5.9	3.5	4.6
	1.29	1.61	1.59	1.68	1.76	1.82	1.65	1.62	1.68	1.91	1.81	1.35	1.38
200	2.6	3.3	4.5	4.5	3.7	3.1	3.4	4.2	6.9	8.9	7.3	4.3	5.7
	1.24	1.54	1.52	1.61	1.68	1.74	1.58	1.55	1.61	1.83	1.74	1.29	1.35
Freq	3.9	6.1	7.6	8.0	6.8	5.2	5.0	6.5	10.3	24.0	12.4	4.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.9	1.1	1.8	1.7	1.3	1.1	1.3	1.5	2.5	3.3	2.4	1.4	2.0
	1.03	1.17	1.37	1.38	1.35	1.35	1.27	1.27	1.33	1.50	1.38	1.05	1.15
25	1.2	1.5	2.4	2.2	1.7	1.5	1.7	2.0	3.4	4.4	3.2	1.9	2.7
	1.09	1.24	1.44	1.46	1.43	1.43	1.34	1.35	1.40	1.58	1.46	1.11	1.20
50	1.5	1.8	2.9	2.7	2.0	1.8	2.0	2.5	4.1	5.3	3.9	2.3	3.3
	1.17	1.34	1.56	1.59	1.55	1.55	1.45	1.46	1.52	1.69	1.58	1.20	1.28
100	1.8	2.3	3.5	3.3	2.5	2.2	2.5	3.0	5.0	6.4	4.8	2.8	4.1
	1.33	1.51	1.78	1.80	1.76	1.76	1.65	1.66	1.73	1.92	1.80	1.35	1.40
200	2.2	2.8	4.3	4.1	3.0	2.7	3.0	3.7	6.2	7.8	5.8	3.5	4.9
	1.28	1.46	1.72	1.74	1.70	1.70	1.59	1.60	1.67	1.86	1.74	1.31	1.37
Freq	4.0	6.3	7.9	8.2	6.5	4.9	4.9	6.6	11.0	26.2	9.9	3.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.0	138	2.8	60	2.5	39	1.9	19
25	4.4	175	3.4	93	3.0	67	2.6	40
50	4.7	210	3.9	122	3.5	94	3.1	63
100	5.1	277	4.6	186	4.2	141	3.7	95
200	5.6	396	5.7	371	5.2	273	4.5	177

Cabo Carvoeiro

39° 21′ 00″ N 09° 24′ 00″ W	UTM 29 E 465533 m N 4355767 m	32 m a.s.l.

Located on a promontory where the coastline forms a steep incline. The terrain is gently rolling and very open in most directions. The anemometer is situated 4.5 m above a 3.5-m high hut (3 × 3 × 3.5 m) and is quite sheltered by buildings in the sector 190°-220°.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	100	0.00									15	-4
30	0.03	1000	0.00									11	-3
60	0.03	2250	0.00									10	2
90	0.03	100	0.05	1500	0.20	2500	0.03					20	5
120	0.03	800	0.004	2000	0.00	4500	0.05					28	3
150	0.03	250	0.00									23	-2
180	0.03	200	0.00										-4
210	0.03	200	0.00									-59	-2
240	0.03	150	0.00									-1	2
270	0.03	100	0.00									14	4
300	0.03	50	0.00									21	2
330	0.03	75	0.00									21	-2

Height of anemometer: 8.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	34.7	7	55	83	140	151	168	153	100	74	54	12	1	0	0	6.2	2.62
30	13.2	19	99	123	174	176	151	128	63	36	25	5	0	0	0	5.2	2.33
60	3.1	26	159	268	245	141	94	36	17	5	2	1	4	0	0	3.8	1.89
90	4.7	42	172	217	212	156	82	73	29	12	4	0	0	0	1	4.0	1.85
120	3.5	21	76	167	177	179	143	113	56	35	29	1	0	1	0	5.1	2.19
150	5.2	31	149	168	167	155	97	99	64	35	23	10	2	0	0	4.8	1.83
180	9.8	28	139	155	154	121	138	103	58	43	44	15	4	1	0	5.2	1.86
210	3.3	41	171	188	149	121	113	97	63	23	26	4	3	0	0	4.6	1.76
240	3.6	29	190	144	175	151	116	68	58	42	13	7	5	3	0	4.7	1.73
270	7.4	17	151	169	159	120	113	88	55	57	45	16	6	1	2	5.1	1.64
300	4.2	35	171	184	154	94	98	105	58	32	39	21	3	7	0	4.8	1.54
330	7.3	28	126	119	174	150	107	99	69	61	45	16	6	0	1	5.3	1.78
Total	100.0	20	109	134	161	147	137	118	72	51	38	10	2	1	0	5.4	2.06

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.1	5.2	5.1	4.9	5.1	4.6	4.3	4.4	4.0	4.2	4.5	5.1	4.7
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	5.2	5.5	5.1	4.7	5.0	4.5	4.2	4.2	3.8	4.3	4.7	5.0	4.7
9	5.3	5.7	5.2	4.6	4.7	5.4	4.3	4.5	3.7	4.6	5.1	5.5	5.0
12	5.2	5.4	5.0	4.7	4.7	4.4	3.9	4.1	3.7	4.2	4.6	5.2	4.6
15	–	–	–	–	–	–	–	–	–	–	–	–	–
18	5.1	5.4	5.3	5.2	5.3	5.0	4.5	4.5	4.2	4.5	4.8	5.2	4.9
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	5.2	5.4	5.1	4.9	5.0	4.6	4.2	4.3	3.9	4.3	4.7	5.1	4.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	5.9	4.7	5.4	5.6	4.2	5.5	11.5	5.2	4.6	4.2	4.5	5.5
	2.58	2.35	1.87	2.22	2.58	1.85	1.85	1.65	1.31	1.64	1.57	1.77	1.59
25	6.0	6.5	5.1	5.9	6.1	4.6	6.0	12.5	5.8	5.0	4.6	4.9	6.0
	2.66	2.43	1.93	2.29	2.66	1.90	1.90	1.66	1.35	1.69	1.62	1.83	1.62
50	6.4	6.9	5.5	6.4	6.6	5.0	6.4	13.3	6.2	5.4	4.9	5.3	6.5
	2.73	2.49	1.98	2.35	2.73	1.96	1.96	1.68	1.39	1.74	1.66	1.88	1.66
100	7.0	7.5	5.9	6.9	7.1	5.4	7.0	14.1	6.7	5.9	5.3	5.7	7.0
	2.64	2.41	1.92	2.28	2.65	1.89	1.89	1.68	1.35	1.68	1.61	1.82	1.65
200	7.7	8.3	6.5	7.7	7.9	5.9	7.7	15.1	7.3	6.4	5.8	6.3	7.7
	2.50	2.28	1.82	2.15	2.51	1.79	1.79	1.66	1.27	1.59	1.52	1.73	1.64
Freq	30.6	17.2	4.4	4.5	3.2	4.6	9.1	4.4	4.4	7.0	4.0	6.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	4.1	3.2	3.9	3.7	3.1	4.0	7.6	3.3	3.1	2.9	3.5	3.8
	2.11	1.92	1.54	1.92	2.08	1.46	1.26	1.42	1.41	1.37	1.37	1.83	1.40
25	4.7	4.9	3.8	4.6	4.4	3.8	4.9	8.9	4.0	3.8	3.5	4.2	4.6
	2.28	2.07	1.66	2.07	2.24	1.57	1.36	1.45	1.52	1.48	1.48	1.98	1.49
50	5.4	5.7	4.4	5.3	5.1	4.4	5.8	9.9	4.6	4.4	4.1	4.9	5.3
	2.56	2.33	1.87	2.33	2.53	1.76	1.52	1.48	1.71	1.65	1.66	2.23	1.62
100	6.4	6.8	5.3	6.3	6.1	5.3	6.9	11.0	5.5	5.3	4.9	5.8	6.3
	2.73	2.48	1.98	2.47	2.69	1.87	1.62	1.55	1.82	1.76	1.76	2.37	1.77
200	7.9	8.4	6.5	7.9	7.6	6.5	8.5	12.3	6.8	6.5	6.1	7.2	7.8
	2.60	2.37	1.89	2.37	2.56	1.79	1.54	1.54	1.74	1.68	1.69	2.26	1.81
Freq	28.2	14.1	4.0	4.3	3.5	5.6	8.0	4.6	5.0	6.4	4.5	11.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.6	2.8	3.4	3.2	2.8	3.7	6.1	2.8	2.7	2.6	3.1	3.3
	2.12	1.94	1.53	1.92	2.02	1.47	1.19	1.33	1.41	1.39	1.43	1.90	1.40
25	4.2	4.4	3.4	4.2	3.9	3.5	4.6	7.4	3.5	3.4	3.3	3.9	4.1
	2.27	2.07	1.63	2.05	2.17	1.57	1.26	1.35	1.51	1.49	1.53	2.04	1.48
50	4.9	5.2	4.1	4.9	4.6	4.2	5.4	8.4	4.2	4.0	3.8	4.6	4.8
	2.51	2.30	1.81	2.27	2.40	1.74	1.37	1.38	1.66	1.64	1.69	2.25	1.60
100	5.9	6.2	4.8	5.8	5.4	5.0	6.4	9.5	5.0	4.8	4.6	5.4	5.8
	2.76	2.52	1.98	2.49	2.63	1.91	1.50	1.44	1.82	1.80	1.85	2.47	1.76
200	7.3	7.6	6.0	7.2	6.7	6.1	7.8	10.8	6.2	6.0	5.7	6.7	7.1
	2.64	2.41	1.90	2.38	2.52	1.83	1.44	1.45	1.75	1.73	1.77	2.37	1.79
Freq	26.8	13.0	4.0	4.2	3.6	6.0	7.5	4.6	5.2	6.1	4.7	14.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.8	2.2	2.7	2.4	2.3	3.2	4.3	2.2	2.1	2.0	2.5	2.6
	2.08	1.92	1.56	2.01	1.97	1.49	1.19	1.23	1.40	1.37	1.41	1.98	1.40
25	3.6	3.7	3.0	3.6	3.2	3.1	4.1	5.5	2.9	2.8	2.7	3.3	3.4
	2.20	2.03	1.65	2.13	2.09	1.58	1.23	1.24	1.48	1.44	1.50	2.10	1.47
50	4.3	4.4	3.6	4.3	3.9	3.7	5.0	6.5	3.6	3.4	3.3	4.0	4.2
	2.39	2.20	1.79	2.31	2.27	1.71	1.28	1.26	1.61	1.56	1.62	2.28	1.56
100	5.2	5.3	4.4	5.2	4.7	4.5	5.9	7.6	4.3	4.2	4.0	4.8	5.1
	2.72	2.51	2.04	2.63	2.58	1.95	1.39	1.31	1.83	1.78	1.85	2.60	1.73
200	6.3	6.5	5.3	6.3	5.7	5.5	7.0	8.8	5.3	5.1	4.9	5.9	6.1
	2.62	2.42	1.96	2.54	2.49	1.88	1.39	1.34	1.76	1.72	1.78	2.50	1.77
Freq	24.8	11.3	4.1	4.0	3.9	6.6	6.7	4.7	5.6	5.7	5.1	17.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.9	183	3.5	76	3.0	50	2.4	24
25	5.4	234	4.1	118	3.7	87	3.1	52
50	5.8	280	4.8	160	4.3	124	3.7	82
100	6.3	356	5.6	237	5.1	184	4.5	125
200	6.9	482	6.9	434	6.3	329	5.5	217

Coimbra

40° 12′ 00″ N 08° 25′ 00″ W	UTM 29 E 549649 m N 4450195 m	141 m a.s.l.

Located in the urban area of the city of Coimbra. There are mountains and hills in most directions beyond 5 km, but these do not seem to influence the wind measurements. The anemometer is situated 3.7 m above the roof of a 6.9-m high building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.40												
30	0.40												
60	0.40												
90	0.40												
120	0.40												
150	0.40												
180	0.40												
210	0.40												
240	0.40												
270	0.40												
300	0.40	2500	0.05										
330	0.40												

Height of anemometer: 10.6 m a.g.l. Period: 71010103–80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.3	384	268	152	121	41	22	7	3	2	0	0	0	0	0	1.9	1.28
30	3.4	481	195	123	85	58	26	22	3	6	1	0	0	0	0	1.8	1.05
60	3.9	420	138	126	117	64	39	40	23	16	9	7	0	0	0	2.5	1.10
90	6.3	292	163	141	111	70	63	58	36	31	21	11	4	0	0	3.3	1.18
120	7.0	279	218	169	115	54	46	42	32	22	14	5	3	0	1	2.8	1.09
150	13.2	198	307	187	108	56	42	31	21	21	17	9	3	2	0	2.7	1.04
180	11.2	220	281	157	114	57	48	40	28	24	15	10	4	1	0	2.8	1.08
210	4.1	447	228	123	92	49	35	15	5	5	1	0	0	0	0	1.8	1.08
240	3.9	460	219	145	98	36	24	14	3	1	0	0	0	0	0	1.8	1.16
270	7.0	312	278	198	140	40	22	8	2	0	0	0	0	0	0	2.2	1.49
300	15.3	168	257	228	189	77	49	22	7	2	0	1	0	0	0	2.9	1.72
330	19.5	143	247	216	193	97	64	30	6	3	1	0	0	0	0	3.1	1.79
Total	100.0	253	249	182	140	66	46	29	14	11	7	4	1	0	0	2.7	1.24

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.5	2.5	1.7	1.4	1.4	1.1	1.3	1.1	1.0	1.8	2.0	2.8	1.7
3	2.6	2.5	1.8	1.6	1.4	1.2	1.0	1.1	1.1	1.9	2.1	2.9	1.8
6	2.6	2.8	2.0	1.9	1.5	1.3	1.1	1.1	1.4	2.0	2.2	3.0	1.9
9	2.8	2.9	2.3	2.3	2.1	1.9	1.6	1.5	1.7	2.3	2.3	3.0	2.2
12	3.3	3.4	3.0	3.0	2.8	2.6	2.4	2.5	2.5	2.9	2.7	3.3	2.9
15	3.2	3.4	3.4	3.5	3.7	3.6	3.6	3.8	3.2	3.2	2.8	3.1	3.4
18	2.8	3.3	3.6	3.8	3.9	3.6	4.1	4.0	3.4	2.8	2.4	2.8	3.4
21	2.4	2.5	1.9	2.0	2.2	2.1	2.4	2.2	1.6	1.6	2.0	2.9	2.1
Day	2.8	2.9	2.5	2.4	2.4	2.2	2.2	2.2	2.0	2.3	2.3	3.0	2.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	4.0	4.7	6.4	6.2	5.7	5.6	5.0	3.8	4.4	5.4	6.1	5.5
	1.89	1.36	1.18	1.26	1.22	1.14	1.14	1.15	1.31	1.64	1.94	2.04	1.33
25	6.3	4.3	5.1	7.0	6.7	6.2	6.1	5.5	4.2	4.8	5.9	6.7	6.0
	1.95	1.40	1.20	1.27	1.23	1.15	1.15	1.17	1.35	1.69	2.01	2.10	1.35
50	6.7	4.7	5.5	7.5	7.2	6.6	6.6	5.9	4.5	5.2	6.3	7.2	6.4
	2.00	1.43	1.23	1.30	1.26	1.18	1.18	1.20	1.39	1.74	2.06	2.15	1.38
100	7.3	5.1	5.9	8.0	7.7	7.1	7.0	6.3	4.9	5.6	6.9	7.8	6.9
	1.94	1.39	1.21	1.29	1.24	1.17	1.17	1.18	1.35	1.68	1.99	2.09	1.37
200	8.1	5.5	6.4	8.5	8.2	7.6	7.5	6.8	5.4	6.1	7.6	8.6	7.5
	1.84	1.32	1.16	1.26	1.22	1.14	1.14	1.15	1.28	1.60	1.89	1.98	1.34
Freq	11.7	4.3	3.7	5.2	6.6	10.3	12.1	7.3	4.0	5.5	11.6	17.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	2.6	3.4	4.6	4.1	3.8	4.0	3.0	2.6	3.1	3.8	4.4	3.7
	1.44	1.10	1.06	1.16	1.09	1.03	1.05	1.01	1.13	1.44	1.67	1.73	1.17
25	4.3	3.2	4.1	5.5	4.9	4.6	4.7	3.7	3.1	3.7	4.6	5.3	4.5
	1.56	1.18	1.12	1.20	1.13	1.06	1.08	1.07	1.22	1.55	1.80	1.87	1.23
50	5.0	3.8	4.8	6.2	5.6	5.2	5.4	4.3	3.7	4.3	5.3	6.1	5.2
	1.75	1.31	1.20	1.26	1.18	1.10	1.13	1.17	1.37	1.74	2.02	2.10	1.33
100	5.9	4.6	5.6	7.1	6.4	6.0	6.2	5.2	4.4	5.2	6.3	7.2	6.2
	1.86	1.40	1.28	1.34	1.26	1.18	1.21	1.24	1.45	1.85	2.15	2.24	1.44
200	7.3	5.6	6.7	8.2	7.4	6.8	7.1	6.2	5.5	6.4	7.9	9.0	7.4
	1.77	1.34	1.24	1.31	1.23	1.15	1.18	1.20	1.38	1.77	2.05	2.13	1.43
Freq	8.2	3.8	3.8	5.8	6.8	11.9	11.6	5.6	3.9	6.3	13.7	18.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.3	3.1	4.1	3.6	3.4	3.5	2.6	2.2	2.7	3.3	3.8	3.3
	1.41	1.08	1.08	1.17	1.10	1.04	1.07	1.06	1.15	1.49	1.68	1.76	1.19
25	3.6	2.9	3.8	5.0	4.4	4.2	4.3	3.3	2.8	3.4	4.2	4.8	4.1
	1.51	1.15	1.12	1.21	1.13	1.07	1.10	1.12	1.22	1.59	1.80	1.88	1.24
50	4.3	3.5	4.5	5.8	5.1	4.8	5.0	4.0	3.4	4.0	4.9	5.6	4.8
	1.67	1.27	1.20	1.25	1.18	1.12	1.15	1.24	1.35	1.76	1.99	2.08	1.33
100	5.1	4.2	5.3	6.7	6.0	5.6	5.8	4.8	4.1	4.8	5.8	6.7	5.7
	1.83	1.39	1.31	1.35	1.28	1.21	1.24	1.35	1.48	1.93	2.19	2.28	1.46
200	6.3	5.1	6.3	7.7	6.9	6.5	6.7	5.9	5.0	5.9	7.2	8.3	6.9
	1.75	1.33	1.26	1.32	1.25	1.18	1.21	1.30	1.41	1.85	2.09	2.19	1.45
Freq	6.9	3.6	3.8	6.0	6.9	12.4	11.4	4.9	3.9	6.6	14.4	18.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	1.8	2.5	3.2	2.8	2.6	2.8	1.8	1.8	2.2	2.7	3.0	2.6
	1.27	1.05	1.10	1.17	1.09	1.04	1.08	1.08	1.17	1.49	1.69	1.77	1.19
25	2.5	2.3	3.3	4.2	3.6	3.4	3.6	2.4	2.3	2.8	3.5	4.0	3.4
	1.35	1.10	1.13	1.20	1.12	1.06	1.10	1.14	1.23	1.57	1.79	1.88	1.23
50	3.1	2.9	4.0	5.0	4.3	4.1	4.3	3.0	2.9	3.5	4.3	4.9	4.1
	1.46	1.19	1.19	1.24	1.16	1.10	1.14	1.23	1.33	1.71	1.95	2.04	1.29
100	3.8	3.6	4.8	5.9	5.2	4.9	5.2	3.7	3.5	4.2	5.2	5.9	5.0
	1.66	1.35	1.31	1.31	1.24	1.17	1.21	1.39	1.51	1.94	2.22	2.32	1.42
200	4.6	4.4	5.8	6.9	6.1	5.8	6.1	4.4	4.3	5.1	6.3	7.2	6.0
	1.60	1.30	1.29	1.33	1.25	1.18	1.23	1.35	1.46	1.87	2.14	2.24	1.44
Freq	5.3	3.4	3.9	6.3	7.1	13.2	11.1	4.1	3.9	7.2	15.2	19.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.0	257	3.5	113	3.1	74	2.4	36
25	5.5	325	4.2	172	3.8	126	3.2	75
50	5.9	382	4.8	225	4.4	176	3.8	116
100	6.3	484	5.6	309	5.2	242	4.5	169
200	6.9	656	6.7	550	6.2	426	5.4	285

Faro

37° 01′ 00″ N 07° 58′ 00″ W	UTM 29 E 591927 m N 4097287 m	8 m a.s.l.

Location on the southern coast of Portugal, 3 km SW of the city of Faro. There are distant mountains from NNW-NE through N. The sea lies 2 km away between E and SW. The surrounding countryside is characterized by large open areas (salinas) from SE through W. The anemometer is situated S of the runway and airport buildings appear in the NW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	300	0.20									-1	1
30	0.05	400	0.20	900	0.05	1500	0.20						1
60	0.05	1500	0.40	3500	0.05							1	
90	0.20	250	0.05	2000	0.40	4000	0.05						-1
120	0.05	10000	0.00									-1	-1
150	0.20	350	0.05	5000	0.00							-2	
180	0.20	500	0.05	3000	0.00							-1	1
210	0.20	8000	0.05	2500	0.00								1
240	0.20	1500	0.05	2600	0.00							1	
270	0.10	4100	0.00										-1
300	0.03	1150	0.05	2500	0.20	4000	0.05					-1	-1
330	0.03	800	0.20	2500	0.05							-2	

Height of anemometer: 7.1 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.4	95	345	233	102	73	79	33	24	12	3	0	0	0	0	2.8	1.33
30	8.9	71	327	338	137	58	42	14	8	4	2	0	0	0	0	2.8	1.65
60	7.1	74	209	234	167	129	101	52	25	6	2	0	0	0	0	3.6	1.83
90	7.2	51	95	132	150	168	168	128	61	29	10	6	1	0	0	5.1	2.43
120	7.1	58	118	145	156	180	176	83	44	19	14	6	0	0	0	4.8	2.31
150	3.3	111	130	143	158	153	123	60	49	37	24	10	1	0	0	4.6	1.79
180	4.4	105	153	214	211	105	90	53	31	15	16	4	4	0	0	3.9	1.56
210	5.3	66	114	199	214	145	106	60	30	29	25	9	2	0	0	4.3	1.64
240	11.4	40	96	138	168	168	154	108	64	42	14	6	1	0	0	5.1	2.26
270	12.1	38	126	166	164	137	140	92	67	43	21	4	1	0	0	4.9	2.02
300	14.9	47	242	245	163	104	87	46	30	23	12	1	0	0	0	3.6	1.55
330	10.0	58	199	213	156	134	110	61	34	24	9	2	1	0	0	4.0	1.74
Total	100.0	61	187	204	159	127	114	67	40	24	12	3	1	0	0	4.1	1.74

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.1	3.3	3.1	3.0	3.1	2.7	2.8	2.5	2.4	2.8	2.6	3.2	2.9
3	3.2	3.4	3.3	2.9	2.7	2.4	2.4	2.1	2.2	2.9	2.7	3.3	2.8
6	3.2	3.4	3.0	2.8	2.4	2.1	2.2	2.0	2.2	2.9	2.9	3.4	2.7
9	3.2	3.7	3.5	3.8	3.6	3.5	3.3	2.9	3.0	3.3	3.1	3.6	3.4
12	4.5	5.0	5.4	5.2	5.0	4.9	4.7	4.5	4.7	4.9	4.4	4.7	4.8
15	5.0	5.3	5.6	5.6	5.6	5.4	5.2	4.9	4.9	5.1	4.5	4.8	5.2
18	3.8	4.2	4.9	5.0	5.3	5.0	5.0	4.7	4.1	3.7	2.9	3.3	4.3
21	3.2	3.2	3.3	3.4	3.9	3.5	3.5	3.3	3.0	2.9	2.7	3.3	3.3
Day	3.6	3.9	4.0	3.9	3.9	3.7	3.6	3.4	3.3	3.5	3.2	3.7	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	4.9	5.7	8.8	7.4	7.3	6.3	6.9	8.0	7.5	6.3	6.4	6.7
	1.69	1.85	2.06	2.65	2.23	1.89	1.57	1.64	2.18	2.06	1.96	2.01	1.90
25	6.1	5.4	6.3	9.6	8.1	7.9	6.9	7.6	8.7	8.3	6.9	7.0	7.4
	1.74	1.90	2.13	2.73	2.30	1.95	1.62	1.69	2.25	2.13	2.02	2.08	1.95
50	6.5	5.8	6.7	10.3	8.7	8.5	7.4	8.1	9.4	8.9	7.4	7.6	7.9
	1.78	1.96	2.19	2.80	2.37	2.00	1.66	1.74	2.31	2.19	2.07	2.13	2.00
100	7.1	6.3	7.3	11.2	9.4	9.3	8.0	8.8	10.2	9.6	8.0	8.2	8.6
	1.73	1.89	2.12	2.72	2.29	1.94	1.61	1.69	2.23	2.12	2.00	2.06	1.94
200	7.8	7.0	8.1	12.4	10.4	10.2	8.8	9.6	11.2	10.6	8.9	9.0	9.5
	1.64	1.79	2.01	2.57	2.17	1.83	1.52	1.60	2.12	2.01	1.90	1.95	1.85
Freq	8.8	8.7	7.3	7.1	7.2	4.2	4.2	5.1	9.9	11.8	14.3	11.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.5	4.3	6.5	4.9	5.0	4.2	4.9	5.5	5.0	4.1	4.6	4.6
	1.38	1.67	1.85	2.41	1.88	1.49	1.33	1.43	1.87	1.67	1.60	1.73	1.62
25	4.4	4.1	5.2	7.7	5.9	6.0	5.1	5.9	6.7	6.0	5.0	5.5	5.6
	1.49	1.79	2.00	2.59	2.03	1.61	1.43	1.54	2.02	1.80	1.72	1.87	1.74
50	5.1	4.8	6.0	8.9	6.8	7.0	5.9	6.8	7.7	7.0	5.8	6.4	6.5
	1.67	2.02	2.25	2.90	2.28	1.80	1.60	1.72	2.27	2.02	1.93	2.10	1.93
100	6.1	5.7	7.1	10.5	8.1	8.3	7.1	8.1	9.1	8.3	6.9	7.6	7.7
	1.78	2.15	2.39	3.10	2.43	1.92	1.70	1.83	2.42	2.15	2.06	2.24	2.04
200	7.6	7.1	8.8	13.0	10.1	10.3	8.8	10.0	11.4	10.4	8.6	9.4	9.6
	1.70	2.05	2.28	2.96	2.32	1.83	1.63	1.75	2.31	2.05	1.97	2.14	1.96
Freq	8.5	8.7	6.8	7.2	7.0	3.5	4.5	5.5	11.1	12.1	14.8	10.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.0	3.9	5.5	4.3	4.2	3.7	4.3	4.8	4.2	3.6	3.9	4.0
	1.34	1.61	1.85	2.35	1.87	1.45	1.32	1.49	1.86	1.59	1.60	1.71	1.60
25	3.8	3.7	4.8	6.8	5.3	5.3	4.6	5.4	5.9	5.2	4.5	4.8	5.0
	1.43	1.73	1.98	2.52	2.00	1.55	1.41	1.60	1.99	1.70	1.71	1.83	1.71
50	4.5	4.4	5.7	8.0	6.3	6.2	5.4	6.4	6.9	6.2	5.3	5.7	5.9
	1.58	1.90	2.19	2.79	2.22	1.71	1.56	1.76	2.20	1.88	1.89	2.03	1.87
100	5.4	5.2	6.8	9.5	7.5	7.4	6.5	7.6	8.3	7.4	6.3	6.8	7.0
	1.73	2.09	2.40	3.06	2.44	1.88	1.71	1.94	2.42	2.06	2.08	2.22	2.04
200	6.7	6.5	8.3	11.7	9.2	9.1	8.0	9.4	10.2	9.1	7.8	8.4	8.7
	1.65	2.00	2.30	2.93	2.33	1.79	1.63	1.85	2.31	1.97	1.99	2.13	1.96
Freq	8.5	8.5	6.8	7.2	6.7	3.6	4.6	6.0	11.2	12.4	14.4	10.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.5	3.3	4.2	3.4	3.2	2.9	3.5	3.7	3.2	2.9	3.0	3.2
	1.46	1.72	1.87	2.32	1.84	1.42	1.33	1.58	1.83	1.52	1.65	1.69	1.62
25	3.3	3.3	4.3	5.6	4.5	4.3	3.9	4.6	4.9	4.2	3.9	4.0	4.2
	1.55	1.82	1.99	2.46	1.95	1.51	1.40	1.68	1.94	1.61	1.75	1.79	1.72
50	4.0	4.0	5.2	6.7	5.4	5.2	4.8	5.6	5.9	5.1	4.7	4.9	5.1
	1.68	1.98	2.16	2.67	2.12	1.63	1.52	1.82	2.10	1.75	1.90	1.94	1.85
100	4.9	4.8	6.3	8.1	6.6	6.3	5.8	6.8	7.2	6.2	5.7	5.9	6.2
	1.91	2.25	2.46	3.04	2.42	1.86	1.73	2.07	2.40	1.99	2.16	2.21	2.09
200	6.0	5.9	7.7	9.9	8.0	7.7	7.1	8.3	8.7	7.6	6.9	7.2	7.5
	1.84	2.17	2.37	2.93	2.33	1.79	1.67	2.00	2.31	1.92	2.08	2.13	2.02
Freq	8.6	8.2	6.8	7.3	6.2	3.7	4.6	6.7	11.4	12.9	13.7	9.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	262	4.2	107	3.6	71	2.9	34
25	6.5	334	5.0	168	4.4	123	3.8	73
50	7.0	404	5.8	231	5.2	178	4.5	118
100	7.6	531	6.8	365	6.2	276	5.5	183
200	8.4	756	8.5	729	7.7	540	6.7	345

Ferrel

39° 23′ 22″ N	09° 17′ 25″ W	UTM 29	E 475001 m	N 4360109 m	20 m a.s.l.

Located at the coast 10 km northeast of Cabo Carvoeiro. The mast was situated 3.5 km northeast of the village of Ferrel. The distance to the sea is 300 m to the northwest. To the southeast the landscape is undulating and covered by vegetation. Close to the mast the terrain consists of sand dunes.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	500	0.00										
30	0.03	1000	0.00										
60	0.03	500	0.15	1000	0.03	1600	0.15						
90	0.03	300	0.15	800	0.03	1500	0.15						
120	0.03	300	0.15	1200	0.03	2000	0.15						
150	0.03	300	0.15										
180	0.03	1000	0.15										
210	0.03	1200	0.10										
240	0.03												
270	0.03	600	0.00										
300	0.03	300	0.00										
330	0.03	300	0.00										

Height of anemometer: 10.0 m a.g.l. Period: 77010100-78123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	21.0	48	34	70	105	129	144	129	104	78	97	39	14	7	0	6.8	2.16
30	12.0	78	48	138	178	198	95	69	74	41	52	25	2	5	0	5.1	1.63
60	2.3	182	273	291	127	36	18	36	18	18	0	0	0	0	0	2.7	1.37
90	2.9	110	235	353	169	66	37	15	7	7	0	0	0	0	0	2.9	1.81
120	6.4	66	50	179	176	156	156	103	73	23	17	0	0	0	0	4.9	2.32
150	4.8	115	62	66	173	230	155	93	53	40	13	0	0	0	0	5.1	2.55
180	6.0	77	123	176	141	134	116	81	56	35	46	15	0	0	0	4.8	1.74
210	7.9	91	54	78	75	113	102	132	121	97	110	27	0	0	0	6.7	2.50
240	4.6	167	37	93	126	121	153	60	84	60	66	33	0	0	0	5.6	1.91
270	6.0	120	39	131	163	134	92	78	92	71	53	18	7	4	0	5.4	1.72
300	6.6	141	99	144	147	118	80	64	48	51	64	36	10	0	0	4.9	1.45
330	19.6	48	60	109	95	143	114	112	95	72	89	43	14	3	2	6.5	1.98
Total	100.0	82	66	123	129	141	116	97	83	60	68	28	7	3	0	5.7	1.83

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.0	5.4	5.1	5.5	5.9	4.5	4.9	4.2	2.3	3.5	4.3	6.0	4.9
3	5.1	5.2	5.0	5.0	5.8	4.6	4.9	4.2	2.1	4.0	4.3	6.1	4.8
6	4.8	5.4	4.6	5.4	5.9	4.2	4.8	4.2	2.3	4.2	5.1	6.1	4.8
9	5.2	5.3	4.6	5.3	5.8	4.3	4.5	3.8	2.2	3.8	5.2	6.0	4.8
12	5.2	5.6	4.8	6.1	5.9	4.7	4.4	3.8	2.8	4.6	5.2	6.7	5.1
15	5.9	5.6	5.2	6.4	6.3	5.6	4.8	4.0	3.3	4.8	5.4	6.4	5.4
18	5.3	4.8	5.1	6.5	6.2	5.6	5.1	4.0	2.9	4.2	5.0	6.5	5.3
21	5.2	5.3	4.9	6.3	5.9	5.0	4.9	3.9	1.9	4.2	5.3	6.4	5.1
Day	5.2	5.3	4.9	5.8	6.0	4.8	4.8	4.0	2.5	4.2	5.0	6.3	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	6.4	5.5	4.6	7.6	8.2	7.7	9.7	8.6	6.3	5.3	6.7	7.1
	2.13	1.74	1.79	2.01	2.56	2.93	2.20	2.68	2.33	1.74	1.49	1.94	1.97
25	8.1	7.0	6.0	5.1	8.3	9.0	8.5	10.6	9.4	6.9	5.8	7.4	7.8
	2.20	1.79	1.85	2.07	2.64	3.03	2.28	2.75	2.40	1.79	1.54	2.01	2.02
50	8.7	7.6	6.5	5.4	9.0	9.6	9.1	11.3	10.1	7.4	6.3	7.9	8.4
	2.26	1.84	1.89	2.12	2.71	3.10	2.33	2.82	2.46	1.84	1.58	2.06	2.07
100	9.5	8.2	7.0	5.9	9.7	10.4	9.9	12.2	10.9	8.1	6.8	8.6	9.1
	2.18	1.78	1.83	2.06	2.62	3.01	2.26	2.75	2.39	1.78	1.53	1.99	2.01
200	10.5	9.0	7.7	6.5	10.8	11.6	10.9	13.4	12.0	8.9	7.4	9.5	10.0
	2.07	1.69	1.74	1.95	2.48	2.85	2.14	2.63	2.28	1.69	1.45	1.88	1.92
Freq	20.7	13.6	4.1	2.8	5.7	5.1	5.8	7.6	5.2	5.8	6.5	17.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.2	2.9	3.4	5.6	5.8	5.3	7.0	5.6	4.1	3.7	4.7	4.9
	1.78	1.40	1.36	1.65	2.31	2.44	1.75	2.45	1.89	1.42	1.28	1.66	1.67
25	6.2	5.0	3.5	4.1	6.7	6.9	6.4	8.3	6.7	5.0	4.4	5.7	5.9
	1.92	1.51	1.46	1.79	2.50	2.64	1.89	2.60	2.05	1.52	1.38	1.79	1.79
50	7.2	5.9	4.1	4.7	7.7	7.9	7.4	9.5	7.7	5.8	5.2	6.6	6.9
	2.16	1.70	1.64	2.01	2.81	2.97	2.13	2.85	2.30	1.71	1.54	2.02	1.99
100	8.6	7.0	4.9	5.6	9.1	9.4	8.8	11.0	9.1	6.9	6.2	7.8	8.1
	2.30	1.80	1.74	2.14	2.99	3.16	2.26	3.05	2.45	1.82	1.65	2.15	2.11
200	10.6	8.7	6.1	7.0	11.3	11.7	10.9	13.4	11.4	8.6	7.7	9.7	10.1
	2.20	1.73	1.67	2.04	2.85	3.02	2.16	2.93	2.33	1.74	1.57	2.05	2.03
Freq	20.4	11.4	2.3	3.0	6.3	4.9	6.1	7.8	4.7	6.1	7.4	19.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	3.6	2.6	3.1	4.9	5.0	4.8	6.0	4.7	3.5	3.4	4.2	4.3
	1.77	1.41	1.44	1.56	2.32	2.40	1.79	2.40	1.85	1.42	1.37	1.68	1.69
25	5.6	4.5	3.3	3.9	6.0	6.1	5.9	7.4	5.9	4.4	4.2	5.2	5.3
	1.90	1.50	1.54	1.67	2.49	2.57	1.92	2.53	1.98	1.52	1.46	1.80	1.79
50	6.5	5.3	3.9	4.6	7.0	7.2	6.9	8.6	6.9	5.2	5.0	6.1	6.2
	2.10	1.66	1.70	1.84	2.76	2.85	2.11	2.74	2.19	1.68	1.62	1.99	1.96
100	7.8	6.4	4.7	5.5	8.3	8.5	8.2	10.0	8.2	6.3	6.0	7.3	7.4
	2.31	1.82	1.87	2.03	3.03	3.13	2.32	3.01	2.40	1.84	1.77	2.19	2.14
200	9.6	7.9	5.7	6.8	10.3	10.5	10.1	12.1	10.1	7.7	7.4	8.9	9.2
	2.21	1.74	1.79	1.94	2.90	2.99	2.22	2.90	2.30	1.76	1.70	2.10	2.06
Freq	19.6	10.5	2.4	3.3	6.2	5.0	6.2	7.5	4.9	6.2	8.6	19.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	2.8	2.1	2.8	3.8	3.8	3.9	4.7	3.6	2.7	2.8	3.3	3.4
	1.75	1.35	1.46	1.72	2.35	2.26	1.88	2.34	1.81	1.40	1.44	1.71	1.69
25	4.6	3.7	2.8	3.7	5.1	5.1	5.2	6.1	4.8	3.6	3.7	4.4	4.5
	1.85	1.43	1.54	1.82	2.49	2.39	1.99	2.45	1.92	1.49	1.52	1.81	1.78
50	5.6	4.5	3.3	4.5	6.1	6.1	6.2	7.3	5.8	4.4	4.5	5.3	5.4
	2.01	1.55	1.67	1.98	2.71	2.60	2.15	2.62	2.08	1.61	1.65	1.97	1.92
100	6.7	5.5	4.1	5.5	7.3	7.3	7.5	8.7	6.9	5.4	5.5	6.4	6.5
	2.29	1.77	1.90	2.25	3.08	2.96	2.44	2.93	2.37	1.83	1.88	2.24	2.16
200	8.2	6.7	5.0	6.7	8.9	9.0	9.1	10.5	8.5	6.6	6.7	7.9	7.9
	2.21	1.70	1.83	2.17	2.97	2.85	2.35	2.86	2.28	1.76	1.81	2.16	2.10
Freq	18.5	9.3	2.4	3.7	6.0	5.2	6.4	7.1	5.1	6.3	10.2	19.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.3	300	4.4	121	3.8	79	3.0	38
25	6.9	382	5.3	191	4.7	139	4.0	83
50	7.4	462	6.1	263	5.5	203	4.8	133
100	8.0	605	7.2	414	6.6	314	5.8	208
200	8.9	852	8.9	818	8.1	605	7.0	389

Flores

39° 27′ 00″ N	31° 08′ 00″ W	UTM 25	E 660621 m	N 4368452 m	28 m a.s.l.

Location on the E coast of the island of Flores (Açôres). There are mountains in the sectors S-N.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.20	200	0.00										
30	0.20	400	0.00										
60	0.20	500	0.00										
90	0.20	500	0.00										
120	0.20	700	0.00										
150	0.20	1200	0.00										
180	0.20	1600	0.00										
210	0.03	300	0.20										
240	0.03	150	0.20										
270	0.03	150	0.20										
300	0.03	150	0.20										
330	0.03	300	0.00										

Height of anemometer: 9.1 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	11.2	55	75	119	173	114	127	94	76	59	69	24	12	3	0	5.8	1.82
30	6.6	95	168	163	239	119	92	59	35	18	10	1	2	1	0	4.0	1.74
60	2.7	243	238	206	155	49	48	23	18	17	4	0	0	0	0	2.8	1.36
90	2.5	238	218	223	183	50	36	32	6	4	7	2	1	0	0	2.8	1.43
120	3.2	149	200	234	255	70	34	35	12	4	4	0	2	0	0	3.2	1.77
150	9.9	54	67	109	174	120	130	100	64	61	75	30	10	5	0	5.9	1.81
180	19.6	38	49	75	139	118	132	111	86	83	101	42	20	6	1	6.7	1.97
210	11.1	77	119	136	137	76	78	71	69	55	112	38	18	10	2	5.9	1.55
240	8.3	80	152	145	163	79	81	78	71	42	62	27	13	3	2	5.0	1.43
270	6.9	94	185	195	161	69	75	73	66	33	31	8	8	1	0	4.0	1.33
300	5.3	136	137	172	157	79	102	72	46	31	37	13	13	4	0	4.3	1.32
330	12.7	62	81	91	148	109	111	103	89	63	89	33	11	7	3	6.2	1.84
Total	100.0	79	110	129	164	98	102	85	67	52	69	26	12	5	1	5.4	1.60

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.6	6.9	4.8	5.2	4.1	3.6	2.6	2.9	3.5	4.5	5.2	5.6	4.4
3	5.2	6.8	4.7	5.6	4.3	3.1	2.5	2.7	3.3	4.6	5.8	5.9	4.6
6	5.5	7.2	4.4	5.6	4.4	3.2	2.4	2.8	3.1	4.6	5.9	5.8	4.6
9	6.5	6.3	5.3	4.9	4.4	3.4	2.5	3.2	3.6	4.6	5.1	5.7	4.6
12	6.2	6.6	5.7	5.4	5.2	4.3	3.5	4.0	4.5	5.2	5.6	5.8	5.2
15	6.6	6.9	6.3	5.8	5.5	4.5	3.7	4.5	4.8	5.5	5.9	6.2	5.5
18	6.2	6.6	5.9	5.8	5.2	4.2	3.4	4.1	4.5	5.3	5.6	5.8	5.2
21	5.0	6.7	4.9	5.1	4.2	3.7	3.0	3.2	3.5	4.7	5.3	5.5	4.5
Day	6.0	6.7	5.6	5.5	4.9	4.0	3.2	3.7	4.1	5.0	5.5	5.8	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	5.9	4.5	4.1	4.8	8.9	10.6	10.4	9.4	7.7	7.8	7.2	8.2
	1.82	1.69	1.46	1.42	1.72	1.76	1.96	1.76	1.55	1.44	1.44	1.79	1.56
25	7.8	6.5	4.9	4.5	5.2	9.7	11.5	11.4	10.2	8.3	8.5	7.9	9.0
	1.88	1.74	1.50	1.46	1.77	1.79	1.99	1.77	1.56	1.46	1.45	1.84	1.58
50	8.4	6.9	5.3	4.8	5.6	10.4	12.3	12.1	10.9	8.9	9.1	8.5	9.6
	1.92	1.79	1.54	1.50	1.81	1.84	2.03	1.80	1.59	1.49	1.48	1.89	1.62
100	9.1	7.5	5.7	5.2	6.1	11.1	13.1	12.9	11.6	9.5	9.7	9.2	10.3
	1.87	1.74	1.49	1.45	1.76	1.81	2.01	1.79	1.58	1.48	1.47	1.83	1.61
200	10.1	8.3	6.3	5.7	6.7	12.0	14.0	13.8	12.4	10.2	10.4	10.2	11.1
	1.77	1.64	1.42	1.38	1.67	1.76	1.97	1.76	1.56	1.44	1.44	1.74	1.58
Freq	11.4	7.1	3.2	2.5	3.1	9.0	18.3	12.2	8.7	7.1	5.5	11.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	3.8	2.7	2.9	3.7	6.6	7.5	7.3	6.5	5.4	5.6	4.9	5.8
	1.51	1.43	1.15	1.24	1.16	1.64	1.77	1.54	1.41	1.35	1.40	1.54	1.42
25	5.8	4.6	3.3	3.5	4.5	7.8	8.8	8.5	7.6	6.3	6.6	5.9	6.8
	1.62	1.54	1.24	1.33	1.25	1.70	1.82	1.57	1.44	1.39	1.45	1.67	1.47
50	6.8	5.4	3.9	4.1	5.3	8.8	9.9	9.5	8.5	7.2	7.5	6.9	7.8
	1.82	1.73	1.39	1.49	1.40	1.80	1.90	1.62	1.49	1.47	1.52	1.87	1.56
100	8.1	6.5	4.7	4.9	6.4	10.0	11.2	10.7	9.6	8.2	8.6	8.2	9.0
	1.94	1.84	1.48	1.58	1.48	1.93	2.04	1.72	1.59	1.57	1.63	1.99	1.68
200	10.1	8.0	5.8	6.1	7.9	11.7	12.9	12.1	10.9	9.5	9.9	10.2	10.6
	1.85	1.76	1.41	1.51	1.42	1.88	1.99	1.69	1.56	1.53	1.59	1.90	1.67
Freq	10.6	6.2	2.7	2.6	3.8	10.8	18.8	10.8	8.2	6.7	6.3	12.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.4	2.4	2.6	3.5	5.8	6.6	6.3	5.6	4.8	4.9	4.3	5.0
	1.49	1.47	1.17	1.27	1.16	1.66	1.77	1.54	1.41	1.38	1.46	1.55	1.43
25	5.2	4.2	3.0	3.2	4.4	7.1	8.0	7.6	6.8	5.8	5.9	5.3	6.2
	1.60	1.57	1.25	1.36	1.23	1.71	1.81	1.56	1.44	1.43	1.51	1.65	1.47
50	6.1	5.0	3.6	3.8	5.2	8.2	9.1	8.7	7.7	6.7	6.9	6.3	7.1
	1.77	1.74	1.37	1.50	1.33	1.79	1.88	1.61	1.48	1.49	1.60	1.83	1.55
100	7.3	5.9	4.3	4.6	6.2	9.4	10.4	9.9	8.8	7.8	8.0	7.5	8.3
	1.94	1.90	1.51	1.65	1.46	1.96	2.02	1.69	1.57	1.63	1.74	2.01	1.68
200	9.0	7.3	5.3	5.6	7.5	11.0	12.0	11.2	10.1	9.1	9.3	9.3	9.8
	1.86	1.82	1.44	1.58	1.40	1.90	1.99	1.69	1.56	1.58	1.69	1.92	1.68
Freq	10.2	5.8	2.7	2.6	4.4	11.6	18.1	10.6	8.1	6.6	7.0	12.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	2.6	1.9	2.1	3.2	4.7	5.1	4.9	4.3	3.8	3.8	3.4	4.0
	1.47	1.41	1.18	1.32	1.25	1.71	1.75	1.54	1.40	1.42	1.53	1.56	1.44
25	4.2	3.4	2.5	2.7	4.2	6.1	6.7	6.4	5.6	5.0	5.0	4.5	5.2
	1.56	1.49	1.25	1.39	1.30	1.75	1.79	1.56	1.42	1.45	1.59	1.65	1.48
50	5.2	4.2	3.1	3.3	5.0	7.3	7.9	7.5	6.6	5.9	5.9	5.4	6.2
	1.69	1.62	1.35	1.51	1.37	1.82	1.85	1.60	1.46	1.51	1.67	1.79	1.54
100	6.3	5.1	3.8	4.1	6.1	8.6	9.2	8.8	7.7	7.0	7.1	6.6	7.4
	1.92	1.85	1.53	1.72	1.52	1.95	1.95	1.67	1.53	1.62	1.82	2.03	1.65
200	7.6	6.2	4.6	5.0	7.3	10.0	10.7	10.1	8.9	8.3	8.4	8.0	8.7
	1.85	1.78	1.48	1.65	1.50	1.97	1.98	1.71	1.56	1.63	1.81	1.96	1.69
Freq	9.7	5.3	2.6	2.7	5.2	12.8	17.1	10.2	7.9	6.4	8.0	12.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	635	5.2	263	4.6	172	3.6	83
25	8.1	807	6.2	405	5.6	295	4.7	175
50	8.6	956	7.0	542	6.4	419	5.6	277
100	9.2	1182	8.0	736	7.4	582	6.6	412
200	10.0	1538	9.4	1206	8.7	945	7.8	661

Funchal

32° 41′ 00″ N 16° 46′ 00″ W	UTM 28 E 334360 m N 3617616 m	49 m a.s.l.

Located in the airport of Santa Catarina (Funchal) on the island of Madeira. Mountains in the SW-N directions have a pronounced influence on the air flow giving large fluctuations in the wind direction.
The anemometer is situated SE of the runways, 7 m above the roof of a 16-m high building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	400	0.30										
30	0.01	200	0.10	400	0.01	1000	0.00						
60	0.01	150	0.10	500	0.00								
90	0.10	300	0.00										
120	0.10	300	0.00										
150	0.10	300	0.00										
180	0.10	300	0.00										
210	0.10	400	0.00										
240	0.10	300	0.05	900	0.00								
270	0.20	200	0.01	500	0.30								
300	0.01	300	0.30										
330	0.01	300	0.30										

Height of anemometer: 23.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	26.6	40	34	89	109	123	166	128	106	88	81	30	5	1	0	6.6	2.35
30	22.4	53	19	57	95	114	180	159	129	97	76	17	3	0	0	6.7	2.82
60	6.5	161	56	104	114	131	152	109	82	56	32	3	1	0	0	5.3	2.19
90	3.2	361	109	171	132	91	61	33	23	10	6	1	0	0	0	2.9	1.37
120	2.1	509	141	170	83	37	30	11	10	7	2	0	0	0	0	1.8	1.07
150	2.5	450	146	185	64	25	39	34	24	15	15	4	0	0	0	2.2	1.00
180	4.6	243	162	232	114	56	43	30	25	28	38	15	7	7	2	3.0	0.97
210	8.3	135	59	113	92	67	84	66	66	74	111	69	39	14	13	6.9	1.59
240	4.3	274	74	133	159	66	61	58	36	41	40	31	13	12	3	4.0	1.09
270	4.3	279	150	278	173	67	34	12	4	3	2	0	0	0	0	2.8	1.78
300	4.7	255	133	201	139	90	78	37	25	17	19	3	1	0	1	3.3	1.31
330	10.5	104	67	155	163	129	129	82	45	45	47	23	6	4	1	5.1	1.63
Total	100.0	136	62	120	116	103	128	99	78	64	60	22	7	3	1	5.7	1.85

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.2	4.9	4.7	4.2	4.0	5.1	4.8	3.9	4.1	4.5	5.0	4.5
3	3.9	4.5	4.2	4.3	4.1	3.8	4.8	4.6	3.6	3.8	4.4	4.6	4.2
6	4.2	4.6	4.3	4.1	4.3	3.8	4.7	4.6	3.7	3.9	4.4	4.7	4.3
9	4.1	4.6	4.3	4.3	4.7	4.3	5.2	5.2	3.8	3.7	4.5	4.7	4.5
12	5.0	5.6	5.6	5.6	5.7	5.3	6.0	6.4	5.3	5.1	5.5	5.5	5.6
15	5.4	5.9	5.6	5.6	5.6	5.5	6.2	6.3	5.4	5.2	5.7	5.6	5.7
18	4.5	5.1	4.9	5.1	5.1	4.8	5.7	5.6	4.5	4.5	5.0	4.9	5.0
21	4.1	4.5	4.6	4.5	4.4	4.2	5.2	4.8	4.0	3.9	4.8	4.8	4.5
Day	4.5	4.9	4.8	4.8	4.8	4.5	5.4	5.3	4.3	4.3	4.9	5.0	4.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.0	6.9	5.5	3.2	1.9	2.0	2.7	6.2	4.4	4.2	5.0	7.8	6.7
	2.53	2.17	2.29	1.39	1.08	0.98	0.93	1.51	1.15	1.76	1.48	1.74	1.61
25	10.9	7.6	6.0	3.5	2.1	2.2	3.0	6.8	4.9	4.6	5.5	8.5	7.3
	2.58	2.24	2.37	1.43	1.12	1.00	0.96	1.55	1.18	1.82	1.52	1.77	1.64
50	11.6	8.1	6.4	3.8	2.2	2.4	3.2	7.3	5.3	4.9	5.9	9.1	7.8
	2.65	2.30	2.43	1.47	1.14	1.02	0.98	1.59	1.21	1.87	1.56	1.83	1.68
100	12.5	8.8	7.0	4.1	2.4	2.5	3.4	7.9	5.7	5.3	6.4	9.8	8.5
	2.60	2.22	2.35	1.42	1.11	0.99	0.95	1.54	1.17	1.81	1.51	1.79	1.65
200	13.6	9.7	7.7	4.4	2.6	2.8	3.7	8.7	6.2	5.9	7.0	10.6	9.3
	2.49	2.11	2.22	1.35	1.05	0.95	0.91	1.46	1.12	1.71	1.44	1.72	1.60
Freq	24.2	23.4	8.6	3.6	2.3	2.4	4.3	7.8	4.8	4.2	4.6	9.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.9	4.5	3.3	1.7	1.1	1.4	2.2	4.3	2.5	2.9	3.8	5.8	4.6
	2.17	2.28	1.70	1.08	0.87	0.81	0.87	1.29	0.92	1.52	1.28	1.67	1.46
25	8.1	5.4	4.0	2.1	1.4	1.7	2.7	5.2	3.1	3.5	4.7	6.9	5.6
	2.30	2.47	1.83	1.16	0.93	0.87	0.92	1.39	0.98	1.64	1.38	1.75	1.53
50	9.3	6.2	4.7	2.5	1.7	2.1	3.3	6.1	3.8	4.1	5.5	7.9	6.4
	2.49	2.77	2.06	1.29	1.03	0.96	1.02	1.56	1.09	1.84	1.55	1.90	1.65
100	10.7	7.3	5.5	3.0	2.0	2.5	3.9	7.3	4.6	4.8	6.5	9.2	7.6
	2.68	2.95	2.19	1.37	1.09	1.01	1.08	1.66	1.16	1.96	1.65	2.04	1.75
200	12.8	9.1	6.9	3.8	2.5	3.1	4.8	9.0	5.6	6.0	8.1	11.0	9.2
	2.58	2.82	2.10	1.31	1.04	0.97	1.04	1.58	1.11	1.87	1.58	1.97	1.72
Freq	26.9	20.7	6.1	3.1	2.2	2.8	5.0	7.8	4.2	4.3	5.2	11.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	3.9	2.8	1.5	1.0	1.3	2.1	3.7	2.4	2.6	3.6	5.3	4.1
	2.12	2.22	1.63	1.06	0.87	0.83	0.91	1.27	0.99	1.48	1.31	1.76	1.46
25	7.1	4.8	3.5	1.9	1.3	1.6	2.7	4.6	3.0	3.2	4.5	6.5	5.0
	2.23	2.38	1.75	1.13	0.92	0.88	0.97	1.36	1.05	1.58	1.40	1.84	1.53
50	8.3	5.6	4.2	2.3	1.6	2.0	3.3	5.5	3.6	3.8	5.3	7.5	5.9
	2.40	2.63	1.93	1.25	1.01	0.96	1.06	1.50	1.15	1.75	1.55	1.97	1.63
100	9.6	6.7	5.0	2.7	2.0	2.5	4.1	6.6	4.4	4.6	6.4	8.8	7.0
	2.63	2.90	2.12	1.37	1.10	1.04	1.15	1.65	1.26	1.92	1.70	2.16	1.76
200	11.6	8.2	6.1	3.3	2.4	3.0	4.9	8.1	5.4	5.7	7.8	10.5	8.5
	2.54	2.77	2.03	1.31	1.06	1.00	1.11	1.58	1.21	1.84	1.63	2.09	1.73
Freq	26.7	19.3	5.8	3.0	2.2	3.0	5.3	7.5	4.2	4.3	5.7	13.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	3.0	2.2	1.2	0.9	1.2	1.9	2.8	1.8	2.0	3.0	4.3	3.2
	2.03	2.15	1.56	1.09	0.88	0.89	0.97	1.24	0.97	1.36	1.37	1.88	1.46
25	5.7	4.0	2.9	1.6	1.1	1.6	2.6	3.7	2.4	2.7	4.0	5.7	4.2
	2.12	2.28	1.65	1.15	0.93	0.94	1.02	1.31	1.02	1.44	1.44	1.96	1.52
50	6.9	4.8	3.5	2.0	1.4	2.0	3.2	4.6	3.0	3.3	4.9	6.8	5.1
	2.26	2.47	1.79	1.24	1.00	1.01	1.10	1.42	1.10	1.56	1.55	2.08	1.61
100	8.2	5.8	4.2	2.4	1.8	2.5	4.0	5.6	3.7	4.0	5.9	8.0	6.1
	2.53	2.82	2.05	1.41	1.12	1.14	1.24	1.61	1.24	1.77	1.76	2.30	1.76
200	9.8	7.0	5.1	2.9	2.2	3.1	4.8	6.8	4.5	4.9	7.2	9.6	7.4
	2.47	2.72	1.97	1.36	1.08	1.10	1.20	1.55	1.20	1.71	1.70	2.27	1.74
Freq	26.3	17.3	5.4	2.8	2.2	3.2	5.7	7.0	4.2	4.4	6.3	15.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	321	4.2	130	3.7	86	2.9	41
25	6.5	409	5.0	203	4.5	149	3.8	88
50	7.0	490	5.8	277	5.3	215	4.5	141
100	7.6	630	6.7	415	6.2	321	5.4	216
200	8.3	866	8.2	768	7.5	588	6.6	389

Lisboa

38° 47′ 00″ N	09° 08′ 00″ W	UTM 29	E 488418 m	N 4292814 m	103 m a.s.l.

Located at the airport of Lisboa and surrounded entirely by built-up areas. The terrain is generally flat and very open close to the station. The anemometer is situated between the runways and there are airport buildings in the NE, E and SE sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1100	0.30									-3	1
30	0.01	150	0.30										3
60	0.01	200	0.40	4000	0.00							4	2
90	0.01	100	0.40	3500	0.00							5	-1
120	0.01	110	0.40	3500	0.00							2	-3
150	0.05	500	0.40	5000	0.00							-2	-2
180	0.01	1100	0.30									-3	1
210	0.01	1000	0.30									1	3
240	0.01	800	0.10	2000	0.30							5	2
270	0.01	500	0.30									6	-1
300	0.01	450	0.30									3	-3
330	0.01	900	0.30									-2	-2

Height of anemometer: 7.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	24.4	25	68	113	145	122	135	129	97	75	73	15	1	0	0	6.1	2.33
30	6.5	85	202	257	184	98	63	59	27	11	14	2	1	0	0	3.5	1.51
60	10.3	58	194	281	253	98	74	31	9	2	1	0	0	0	0	3.4	2.07
90	4.8	104	255	301	187	81	37	24	8	1	1	0	0	0	0	3.0	1.83
120	2.1	209	299	276	123	49	20	11	7	5	2	0	0	0	0	2.5	1.55
150	1.7	153	171	231	159	126	69	48	25	12	6	0	0	0	0	3.4	1.63
180	2.4	146	132	145	175	125	80	56	53	43	37	7	2	0	0	4.3	1.54
210	3.8	95	78	104	109	91	98	114	92	74	108	23	12	2	0	6.3	2.03
240	8.1	51	101	131	160	124	135	114	67	52	50	12	1	0	0	5.4	2.04
270	7.9	64	162	225	175	109	99	71	39	25	25	5	0	0	0	4.1	1.60
300	7.4	58	156	207	187	127	110	76	39	25	13	3	0	0	0	4.2	1.78
330	20.6	25	67	115	154	128	129	148	100	68	58	9	0	0	0	5.9	2.42
Total	100.0	55	124	172	168	114	107	97	64	45	43	8	1	0	0	4.9	1.77

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.3	3.9	3.5	3.6	4.1	4.4	4.5	4.6	3.5	3.1	3.0	3.4	3.7
3	3.2	3.9	3.2	3.5	3.8	4.0	3.9	4.2	3.0	2.9	2.9	3.4	3.5
6	3.3	3.9	3.1	3.4	3.4	3.7	3.8	3.9	2.9	2.9	2.9	3.3	3.4
9	3.3	4.1	3.9	4.3	4.7	4.5	4.2	4.8	3.5	3.4	3.0	3.6	3.9
12	4.5	5.3	5.0	5.0	5.1	4.8	4.6	4.9	4.0	4.2	4.2	4.3	4.7
15	4.9	5.6	5.5	5.7	6.1	6.0	6.0	6.4	5.2	4.7	4.4	4.5	5.4
18	3.9	4.9	5.2	6.0	6.7	6.9	7.2	7.5	6.0	4.5	3.6	3.7	5.5
21	3.6	4.2	4.2	4.6	5.2	5.7	6.4	6.4	5.3	4.0	3.6	3.7	4.7
Day	3.7	4.5	4.2	4.5	4.9	5.0	5.1	5.3	4.2	3.7	3.4	3.7	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.9	8.5	5.2	4.9	4.5	4.8	7.1	9.2	8.5	7.0	6.8	9.4	8.1
	2.70	2.14	1.73	1.91	1.67	1.52	1.79	2.13	2.38	2.05	2.06	2.69	2.05
25	10.8	9.3	5.7	5.3	4.9	5.3	7.7	10.1	9.3	7.7	7.4	10.3	8.8
	2.77	2.19	1.78	1.97	1.73	1.57	1.85	2.17	2.45	2.11	2.13	2.76	2.10
50	11.5	9.9	6.2	5.7	5.3	5.7	8.3	10.8	10.0	8.3	8.0	11.0	9.4
	2.84	2.26	1.83	2.03	1.77	1.62	1.90	2.23	2.51	2.17	2.18	2.83	2.15
100	12.4	10.7	6.7	6.2	5.7	6.2	9.0	11.6	10.8	8.9	8.7	11.9	10.2
	2.78	2.20	1.77	1.96	1.72	1.56	1.84	2.19	2.44	2.10	2.12	2.76	2.11
200	13.6	11.7	7.4	6.9	6.3	6.8	9.8	12.5	11.9	9.9	9.6	13.1	11.2
	2.66	2.10	1.68	1.86	1.63	1.48	1.75	2.11	2.32	1.99	2.00	2.63	2.03
Freq	23.9	12.1	8.8	6.0	2.9	2.0	2.4	3.8	6.6	7.3	7.3	16.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.9	5.1	3.5	3.4	2.9	3.6	5.1	6.8	5.7	4.6	4.8	6.7	5.6
	2.31	1.60	1.63	1.56	1.34	1.35	1.56	1.98	2.02	1.64	1.80	2.38	1.81
25	8.2	6.1	4.2	4.1	3.5	4.3	6.1	8.0	6.9	5.5	5.8	8.0	6.7
	2.45	1.72	1.76	1.69	1.44	1.46	1.66	2.07	2.18	1.77	1.94	2.55	1.92
50	9.4	7.0	4.9	4.8	4.1	5.1	7.0	9.1	7.9	6.4	6.7	9.2	7.7
	2.67	1.91	1.98	1.89	1.62	1.63	1.83	2.22	2.45	1.99	2.18	2.81	2.09
100	10.9	8.3	5.8	5.6	4.9	6.1	8.3	10.4	9.4	7.6	7.9	10.7	9.1
	2.87	2.04	2.10	2.02	1.73	1.73	1.96	2.39	2.61	2.12	2.32	3.01	2.22
200	13.1	10.3	7.2	7.0	6.1	7.5	10.1	12.4	11.7	9.4	9.9	13.1	11.1
	2.76	1.96	2.01	1.93	1.65	1.66	1.88	2.31	2.49	2.02	2.22	2.88	2.17
Freq	24.9	7.8	9.6	4.7	2.3	1.9	2.6	4.1	7.5	7.3	7.3	20.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	4.1	3.0	2.9	2.5	3.2	4.4	5.9	4.9	4.0	4.3	5.9	4.9
	2.33	1.57	1.69	1.49	1.30	1.33	1.54	1.99	2.01	1.64	1.79	2.41	1.82
25	7.4	5.1	3.7	3.6	3.1	4.0	5.5	7.2	6.1	4.9	5.3	7.2	6.0
	2.45	1.68	1.81	1.60	1.39	1.42	1.63	2.07	2.15	1.76	1.92	2.55	1.92
50	8.6	6.0	4.4	4.3	3.7	4.7	6.4	8.3	7.1	5.8	6.2	8.4	7.0
	2.64	1.85	2.01	1.76	1.54	1.56	1.76	2.20	2.38	1.94	2.12	2.78	2.06
100	10.0	7.2	5.2	5.1	4.5	5.6	7.6	9.6	8.5	6.9	7.4	9.9	8.3
	2.90	2.04	2.20	1.94	1.69	1.72	1.94	2.42	2.61	2.13	2.33	3.06	2.24
200	12.0	8.9	6.4	6.3	5.5	6.9	9.2	11.4	10.5	8.5	9.1	12.0	10.1
	2.80	1.95	2.11	1.85	1.62	1.65	1.87	2.34	2.50	2.05	2.23	2.94	2.19
Freq	24.5	7.1	9.4	4.4	2.2	1.9	2.7	4.3	7.6	7.3	7.7	20.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	3.1	2.4	2.3	2.0	2.6	3.7	4.4	3.8	3.1	3.7	4.6	3.9
	2.28	1.54	1.74	1.55	1.29	1.33	1.61	1.94	1.95	1.65	1.88	2.38	1.83
25	6.2	4.1	3.1	3.1	2.7	3.5	4.9	5.8	5.0	4.1	4.8	6.1	5.1
	2.38	1.63	1.84	1.64	1.37	1.41	1.68	2.02	2.06	1.75	2.00	2.50	1.90
50	7.3	5.0	3.8	3.7	3.3	4.3	5.8	6.9	6.0	5.0	5.9	7.3	6.1
	2.54	1.77	2.00	1.78	1.48	1.53	1.79	2.13	2.24	1.90	2.17	2.68	2.03
100	8.7	6.0	4.6	4.5	4.0	5.2	7.0	8.2	7.2	6.0	7.1	8.6	7.3
	2.82	2.02	2.28	2.03	1.69	1.74	2.00	2.35	2.55	2.16	2.47	3.01	2.24
200	10.4	7.3	5.6	5.5	4.9	6.3	8.4	9.8	8.8	7.4	8.6	10.4	8.8
	2.77	1.94	2.19	1.95	1.62	1.67	1.96	2.33	2.46	2.08	2.38	2.93	2.21
Freq	22.4	7.5	8.7	4.1	2.1	2.0	2.9	4.8	7.6	7.3	9.3	21.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.1	414	5.0	162	4.4	106	3.4	51
25	7.8	530	6.0	257	5.4	187	4.5	111
50	8.4	639	6.8	359	6.2	275	5.4	180
100	9.0	819	8.0	550	7.4	421	6.5	284
200	9.9	1121	9.8	1023	9.0	773	7.8	508

Porto

41° 14′ 00″ N	08° 41′ 00″ W	UTM 29	E 526539 m	N 4564788 m	70 m a.s.l.

Location 15 km NW of the centre of the city of Porto. The terrain is very open with a few rows of trees in some sectors. The anemometer is situated on the control tower.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.40	50	0.03	600	0.30							2	-2
30	0.40	200	0.30									-1	-1
60	0.40	50	0.30									-1	2
90	0.40	50	0.30									3	3
120	0.40	50	0.01	700	0.30							7	1
150	0.40	50	0.01	600	0.30							6	-1
180	0.01	800	0.30									2	-2
210	0.01	700	0.30									-1	-1
240	0.01	1000	0.30									-1	1
270	0.01	700	0.30									3	2
300	0.01	1000	0.30									6	1
330	0.01	1250	0.30									6	-1

Height of anemometer: 16.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.1	111	231	229	193	83	62	52	18	9	10	1	0	0	0	3.3	1.56
30	4.2	202	335	251	135	53	18	5	1	1	0	0	0	0	0	2.4	1.70
60	8.3	121	220	270	228	89	52	16	3	0	0	0	0	0	0	3.1	2.09
90	16.7	53	125	203	268	153	110	65	15	4	4	0	0	0	0	4.0	2.25
120	6.4	129	143	188	231	136	81	50	19	8	10	3	1	0	0	3.8	1.83
150	6.1	113	96	115	135	109	100	100	64	64	71	20	10	3	1	5.5	1.69
180	5.4	130	58	90	118	80	96	109	87	63	105	40	17	4	4	6.5	1.83
210	6.0	119	65	86	145	107	122	125	77	45	63	29	13	3	1	5.9	1.85
240	6.9	98	103	144	226	134	101	79	47	30	27	8	4	0	0	4.4	1.64
270	8.0	102	100	147	244	150	125	69	26	15	15	3	0	1	0	4.3	1.93
300	11.4	73	67	105	167	149	140	148	68	45	33	4	0	0	0	5.4	2.31
330	11.5	76	125	146	175	117	108	108	65	40	32	6	1	0	0	4.8	1.82
Total	100.0	99	133	167	199	120	98	80	39	25	27	7	3	1	0	4.3	1.58

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.3	4.1	3.3	2.8	2.8	2.3	2.1	2.0	2.2	3.1	3.2	4.3	3.0
3	4.5	4.3	3.3	3.0	2.9	2.3	2.0	1.9	2.4	3.3	3.5	4.4	3.2
6	4.6	4.5	3.6	3.2	2.9	2.3	2.0	1.9	2.6	3.6	3.7	4.6	3.3
9	4.7	4.5	4.0	3.8	3.7	3.1	2.8	2.3	2.9	3.5	3.8	4.6	3.6
12	5.0	5.1	4.8	4.9	5.4	4.7	4.5	4.4	4.2	4.3	4.1	4.8	4.7
15	4.9	5.5	5.7	6.0	6.1	5.9	5.5	5.6	4.9	4.7	4.3	4.5	5.3
18	3.8	4.5	4.7	5.4	5.7	5.3	5.2	5.1	4.2	3.3	2.9	3.6	4.5
21	3.8	3.8	3.1	2.9	3.4	3.1	2.9	2.6	2.3	2.8	3.1	4.1	3.2
Day	4.4	4.5	4.1	4.0	4.1	3.6	3.4	3.2	3.2	3.6	3.6	4.4	3.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.7	5.3	6.4	6.1	6.5	8.4	8.8	7.1	6.2	6.8	6.7	6.5
	1.89	1.77	2.20	2.50	2.34	1.71	1.93	2.05	1.90	2.09	2.48	2.33	1.96
25	6.2	5.2	5.8	7.0	6.7	7.1	9.2	9.6	7.8	6.8	7.4	7.3	7.1
	1.95	1.83	2.27	2.58	2.42	1.76	1.97	2.09	1.96	2.15	2.56	2.40	2.01
50	6.6	5.6	6.2	7.5	7.2	7.7	9.8	10.2	8.4	7.3	8.0	7.8	7.6
	2.01	1.88	2.33	2.64	2.48	1.80	2.03	2.15	2.01	2.21	2.63	2.47	2.06
100	7.2	6.1	6.7	8.1	7.8	8.3	10.6	11.0	9.1	7.9	8.6	8.5	8.2
	1.94	1.82	2.25	2.56	2.40	1.75	1.98	2.10	1.95	2.14	2.55	2.39	2.01
200	7.9	6.7	7.4	9.0	8.6	9.1	11.5	12.0	10.1	8.8	9.6	9.4	9.1
	1.84	1.73	2.13	2.42	2.27	1.65	1.91	2.02	1.85	2.03	2.41	2.26	1.93
Freq	9.7	6.7	7.4	13.2	10.3	6.0	5.6	5.9	6.9	7.8	9.8	10.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.2	3.8	4.6	4.0	5.0	6.1	6.1	4.6	4.3	4.9	4.5	4.5
	1.53	1.52	1.94	2.13	1.86	1.54	1.73	1.78	1.58	1.83	2.15	1.83	1.68
25	4.5	3.8	4.6	5.5	4.8	6.0	7.3	7.2	5.5	5.2	5.8	5.4	5.4
	1.65	1.64	2.10	2.30	2.01	1.65	1.82	1.88	1.71	1.97	2.33	1.97	1.80
50	5.2	4.4	5.3	6.3	5.5	6.9	8.3	8.2	6.4	6.0	6.7	6.2	6.2
	1.86	1.85	2.36	2.59	2.26	1.84	1.96	2.04	1.91	2.22	2.62	2.22	1.99
100	6.2	5.3	6.3	7.5	6.6	8.2	9.5	9.6	7.6	7.1	8.0	7.4	7.4
	1.98	1.96	2.51	2.76	2.40	1.97	2.11	2.19	2.04	2.36	2.79	2.36	2.13
200	7.7	6.5	7.8	9.3	8.2	10.1	11.3	11.4	9.4	8.8	9.9	9.2	9.1
	1.88	1.88	2.40	2.63	2.30	1.88	2.03	2.11	1.94	2.26	2.66	2.25	2.07
Freq	9.4	5.5	8.6	14.8	7.9	5.8	5.5	6.2	7.2	8.0	10.4	10.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	2.7	3.4	4.0	3.3	4.5	5.4	5.3	4.0	3.8	4.3	3.9	3.9
	1.51	1.54	1.93	2.13	1.79	1.59	1.75	1.78	1.67	1.92	2.20	1.83	1.70
25	3.9	3.3	4.2	4.9	4.1	5.6	6.6	6.4	4.9	4.7	5.3	4.8	4.9
	1.61	1.64	2.06	2.28	1.92	1.69	1.82	1.87	1.78	2.05	2.36	1.96	1.80
50	4.6	4.0	4.9	5.8	4.8	6.5	7.6	7.5	5.8	5.5	6.2	5.6	5.7
	1.78	1.82	2.28	2.53	2.12	1.84	1.94	2.01	1.98	2.27	2.62	2.16	1.96
100	5.5	4.7	5.8	6.9	5.8	7.7	8.9	8.8	6.9	6.6	7.4	6.7	6.8
	1.96	1.99	2.51	2.78	2.33	2.03	2.13	2.20	2.17	2.50	2.87	2.38	2.15
200	6.8	5.8	7.2	8.5	7.1	9.4	10.5	10.5	8.5	8.1	9.1	8.3	8.3
	1.87	1.91	2.40	2.66	2.23	1.94	2.06	2.13	2.08	2.39	2.75	2.28	2.10
Freq	9.2	5.1	9.0	15.4	7.0	5.8	5.5	6.2	7.3	8.1	10.6	10.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.1	2.7	3.2	2.6	3.7	4.3	4.0	3.1	3.0	3.4	3.0	3.1
	1.54	1.57	2.00	2.09	1.73	1.65	1.76	1.75	1.69	1.95	2.19	1.81	1.71
25	3.3	2.8	3.6	4.2	3.4	4.9	5.6	5.3	4.0	4.0	4.4	4.0	4.1
	1.63	1.67	2.12	2.22	1.83	1.74	1.83	1.83	1.79	2.07	2.32	1.92	1.79
50	4.0	3.4	4.3	5.0	4.1	5.9	6.7	6.3	4.9	4.8	5.4	4.8	4.9
	1.77	1.81	2.30	2.41	1.99	1.87	1.93	1.94	1.95	2.25	2.53	2.08	1.93
100	4.8	4.1	5.2	6.0	5.0	7.0	7.9	7.6	5.9	5.8	6.4	5.8	6.0
	2.01	2.06	2.63	2.75	2.27	2.11	2.11	2.16	2.22	2.56	2.88	2.37	2.16
200	5.9	5.0	6.3	7.4	6.1	8.5	9.4	9.1	7.2	7.1	7.9	7.1	7.2
	1.94	1.98	2.53	2.65	2.18	2.05	2.10	2.13	2.14	2.47	2.77	2.29	2.12
Freq	8.9	4.9	9.7	15.7	5.9	5.8	5.5	6.4	7.4	8.3	10.8	10.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.7	224	4.0	91	3.5	60	2.8	29
25	6.3	287	4.8	144	4.3	105	3.6	63
50	6.7	346	5.5	198	5.1	153	4.4	102
100	7.3	450	6.5	307	6.0	236	5.3	159
200	8.0	629	8.1	593	7.4	445	6.4	290

Porto Santo

33° 04′ 00″ N 16° 21′ 00″ W	UTM 28 E 373973 m N 3659543 m	78 m a.s.l.

Located at the airport of Porto Santo, approx. 60 km NE of the island of Madeira. The distance to the sea is 2 km towards W. The terrain is generally flat and very open in most directions. The anemometer is situated on the control tower.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	2500	0.00									7	2
30	0.10	5500	0.00									10	-1
60	0.10	5500	0.00									7	-3
90	0.10	2000	0.00									1	-2
120	0.10	1000	0.00									-1	
150	0.10	1000	0.00									2	2
180	0.10	1500	0.00									7	2
210	0.03	400	0.10	3000	0.00							10	
240	0.03	200	0.10	5000	0.00							7	-3
270	0.03	200	0.10	2500	0.00							2	-2
300	0.03	200	0.10	3000	0.00								
330	0.03	400	0.10	3000	0.00							3	3

Height of anemometer: 18.8 m a.g.l. Period: 71010103–80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	25.6	34	61	105	137	154	188	131	86	59	37	9	1	0	0	5.8	2.58
30	13.2	64	112	167	185	162	143	73	44	28	13	8	1	0	0	4.6	1.99
60	7.5	113	92	159	169	145	139	78	49	30	21	2	1	0	0	4.6	1.94
90	5.0	162	108	195	183	138	107	44	28	18	14	1	1	0	0	3.9	1.76
120	3.5	180	148	187	163	120	99	47	31	11	9	5	0	0	0	3.7	1.63
150	3.8	207	98	150	134	106	118	64	44	38	33	7	1	0	2	4.3	1.50
180	4.0	208	76	94	109	81	85	84	69	68	75	32	12	3	3	5.5	1.55
210	2.3	359	82	128	82	82	62	47	33	35	59	25	3	4	2	3.7	1.12
240	3.0	268	108	126	94	85	91	48	57	42	40	34	2	2	2	4.3	1.28
270	7.1	122	68	133	138	113	137	79	72	56	51	23	6	2	1	5.4	1.76
300	8.8	93	96	129	140	121	129	82	65	51	54	20	8	8	2	5.4	1.66
330	16.2	53	67	115	136	136	165	108	77	63	49	21	6	3	0	5.9	2.09
Total	100.0	98	84	133	145	135	146	92	64	47	37	14	3	2	1	5.2	1.89

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.8	4.1	4.0	3.8	3.5	3.4	3.5	3.1	2.7	3.2	3.0	4.5	3.5
3	3.9	4.6	4.4	4.6	4.4	4.2	4.4	3.6	3.0	3.5	3.5	4.4	4.0
6	4.0	4.5	4.4	4.4	4.4	4.0	4.4	3.5	3.1	3.6	3.5	4.3	4.0
9	4.2	4.3	4.6	4.8	4.9	4.5	4.8	4.2	3.5	3.8	3.8	4.4	4.3
12	4.8	5.3	5.3	5.7	5.4	5.2	5.6	5.2	4.6	4.7	4.7	5.3	5.1
15	5.1	5.7	5.6	5.8	5.8	5.5	5.9	5.3	4.9	4.9	4.8	5.4	5.4
18	4.8	5.1	5.3	5.5	5.6	5.3	5.6	5.0	4.4	4.3	4.1	4.8	5.0
21	4.1	4.6	4.5	4.7	4.6	4.5	4.8	4.1	3.4	3.6	3.7	4.5	4.3
Day	4.4	4.8	4.8	5.0	4.9	4.6	4.9	4.3	3.7	4.0	3.9	4.7	4.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	5.3	5.3	4.7	4.2	4.7	5.8	4.2	4.8	6.2	6.5	6.8	5.8
	2.40	1.98	1.91	1.74	1.60	1.46	1.49	1.13	1.24	1.69	1.65	2.03	1.79
25	6.7	5.8	5.8	5.1	4.6	5.2	6.3	4.6	5.3	6.8	7.2	7.4	6.4
	2.47	2.05	1.97	1.79	1.65	1.51	1.54	1.17	1.28	1.74	1.70	2.10	1.84
50	7.2	6.2	6.3	5.5	4.9	5.6	6.8	5.0	5.8	7.3	7.7	7.9	6.9
	2.54	2.10	2.02	1.84	1.70	1.54	1.58	1.20	1.31	1.78	1.74	2.15	1.89
100	7.8	6.8	6.8	5.9	5.3	6.0	7.4	5.3	6.2	7.9	8.4	8.6	7.4
	2.46	2.03	1.96	1.78	1.64	1.49	1.53	1.16	1.27	1.73	1.69	2.08	1.83
200	8.6	7.5	7.5	6.6	5.8	6.6	8.1	5.8	6.8	8.8	9.2	9.5	8.2
	2.33	1.92	1.85	1.69	1.56	1.42	1.45	1.10	1.21	1.63	1.60	1.97	1.74
Freq	23.6	12.8	7.9	5.6	4.0	3.9	3.8	2.2	2.8	6.9	9.7	16.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.6	3.6	3.1	2.9	3.3	3.8	2.7	3.6	4.3	4.5	4.5	4.0
	2.02	1.63	1.58	1.44	1.30	1.23	1.23	0.96	1.18	1.41	1.45	1.73	1.51
25	5.0	4.4	4.4	3.8	3.5	4.0	4.7	3.4	4.4	5.2	5.4	5.4	4.8
	2.18	1.76	1.70	1.54	1.40	1.32	1.33	1.03	1.27	1.52	1.56	1.87	1.63
50	5.8	5.1	5.1	4.4	4.1	4.7	5.5	4.1	5.2	6.1	6.3	6.3	5.6
	2.45	1.98	1.91	1.73	1.57	1.48	1.48	1.15	1.42	1.71	1.75	2.10	1.82
100	6.9	6.0	6.1	5.2	4.9	5.7	6.6	4.9	6.2	7.2	7.5	7.5	6.7
	2.61	2.11	2.04	1.85	1.67	1.57	1.58	1.22	1.51	1.81	1.87	2.23	1.93
200	8.6	7.5	7.5	6.5	6.1	7.0	8.1	6.0	7.7	8.9	9.4	9.3	8.3
	2.49	2.01	1.94	1.76	1.60	1.50	1.51	1.17	1.44	1.73	1.78	2.13	1.85
Freq	21.7	11.3	7.2	5.2	3.9	3.9	3.5	2.3	3.6	7.6	11.2	18.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.2	3.1	2.7	2.5	2.9	3.3	2.5	3.2	3.7	3.9	3.9	3.5
	1.95	1.60	1.54	1.43	1.29	1.22	1.21	0.98	1.21	1.41	1.48	1.73	1.50
25	4.5	3.9	3.9	3.4	3.2	3.7	4.1	3.1	4.0	4.7	4.9	4.8	4.3
	2.08	1.71	1.64	1.52	1.38	1.30	1.29	1.04	1.29	1.51	1.59	1.85	1.60
50	5.2	4.6	4.6	4.0	3.8	4.4	4.9	3.8	4.8	5.5	5.8	5.7	5.1
	2.31	1.90	1.82	1.69	1.52	1.44	1.42	1.15	1.43	1.66	1.75	2.05	1.77
100	6.2	5.5	5.4	4.8	4.5	5.3	5.9	4.6	5.8	6.6	6.9	6.8	6.1
	2.53	2.08	2.00	1.85	1.67	1.57	1.55	1.25	1.56	1.83	1.92	2.25	1.94
200	7.7	6.8	6.7	5.9	5.6	6.5	7.2	5.6	7.1	8.1	8.5	8.4	7.5
	2.43	1.99	1.91	1.77	1.60	1.51	1.49	1.20	1.50	1.75	1.84	2.15	1.85
Freq	20.7	10.9	7.0	5.0	3.9	3.9	3.3	2.3	4.0	7.8	11.9	19.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.5	2.4	2.1	2.0	2.4	2.5	2.0	2.6	3.0	3.1	3.0	2.7
	1.89	1.64	1.55	1.42	1.26	1.24	1.19	1.00	1.28	1.42	1.53	1.76	1.51
25	3.7	3.3	3.2	2.8	2.7	3.2	3.4	2.7	3.5	3.9	4.1	4.0	3.6
	2.00	1.73	1.64	1.50	1.34	1.31	1.26	1.05	1.35	1.50	1.62	1.87	1.60
50	4.5	4.0	3.9	3.4	3.3	3.9	4.1	3.3	4.3	4.8	5.0	4.8	4.4
	2.17	1.88	1.78	1.63	1.45	1.42	1.37	1.13	1.47	1.63	1.76	2.03	1.73
100	5.4	4.9	4.8	4.2	4.0	4.8	5.1	4.1	5.3	5.8	6.1	5.8	5.3
	2.48	2.14	2.03	1.85	1.64	1.61	1.55	1.28	1.67	1.85	2.00	2.31	1.96
200	6.6	5.9	5.8	5.1	4.9	5.8	6.2	5.0	6.4	7.1	7.4	7.1	6.5
	2.39	2.06	1.96	1.78	1.58	1.55	1.49	1.24	1.60	1.78	1.93	2.22	1.89
Freq	19.2	10.3	6.8	4.8	3.9	3.8	3.1	2.4	4.6	8.2	12.8	20.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.2	182	3.6	76	3.1	50	2.5	24
25	5.7	231	4.3	118	3.9	87	3.2	51
50	6.1	279	5.0	159	4.5	124	3.9	82
100	6.6	368	5.9	250	5.4	190	4.7	126
200	7.3	529	7.4	506	6.7	374	5.8	238

Sagres

36° 59 ′ 00″ N 08° 57 ′ 00″ W	UTM 29 E 504450 m N 4093091 m	40 m a.s.l.

The irregular promontory on which the station is located is almost an island, bounded to the E, S and W by the Atlantic Ocean. The coastline is a steep escarpment. The countryside to the N is predominantly farmland with several small houses and other buildings.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	600	0.005	1500	0.30							22	1
30	0.05	250	0.00	900	0.04	1800	0.30					19	2
60	0.05	250	0.00	1700	0.04	3400	0.00					23	1
90	0.05	200	0.00									23	-1
120	0.05	200	0.00									19	-2
150	0.05	150	0.00									15	-2
180	0.05	150	0.00									13	1
210	0.05	150	0.00									17	3
240	0.05	150	0.00									23	2
270	0.05	200	0.00									23	-1
300	0.05	200	0.00									19	-2
330	0.05	500	0.00	3500	0.01	7000	0.00					21	-2

Height of anemometer: 6.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	31.1	41	21	50	68	99	149	109	133	101	144	55	17	9	2	7.7	2.44
30	6.2	186	94	197	145	121	116	54	43	24	16	3	1	2	0	4.0	1.59
60	2.1	558	45	79	62	52	97	40	46	15	5	2	0	0	0	2.4	1.02
90	9.6	124	55	117	112	130	144	77	84	50	60	29	8	8	0	5.8	1.78
120	4.4	275	44	65	72	89	102	66	70	64	81	38	13	14	9	5.9	1.48
150	1.3	862	8	14	14	16	30	22	11	12	11	0	0	0	0	0.3	0.46
180	3.4	335	53	100	99	84	109	64	48	36	39	20	7	3	3	4.4	1.24
210	2.6	411	26	67	49	78	131	60	62	63	37	12	6	0	0	4.4	1.42
240	6.9	153	33	97	115	106	147	79	74	63	69	36	15	11	1	6.1	1.74
270	6.0	198	54	124	110	119	146	59	66	44	46	14	8	5	8	5.3	1.48
300	18.1	69	38	92	109	115	151	105	96	70	89	36	16	11	1	6.6	1.91
330	8.3	125	13	43	59	93	154	120	152	92	111	26	8	3	0	7.0	2.53
Total	100.0	139	37	83	89	104	140	90	99	71	90	35	12	8	2	6.5	1.91

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	5.3	5.6	5.4	6.0	6.0	6.6	7.1	4.7	4.5	4.3	4.7	5.4
3	4.6	5.6	5.5	5.4	5.6	5.6	6.2	6.2	4.3	4.4	4.4	4.7	5.2
6	4.7	5.7	5.3	5.0	5.1	5.0	5.4	5.5	3.9	4.3	4.5	5.0	4.9
9	4.5	5.5	5.3	5.0	5.4	5.2	5.5	5.4	4.1	4.3	4.5	4.7	4.9
12	4.8	5.8	5.7	5.2	5.8	5.6	5.8	5.8	4.5	4.5	4.8	5.1	5.3
15	5.3	6.2	6.1	5.7	6.3	6.0	6.8	6.7	4.9	5.0	4.9	5.2	5.7
18	5.2	5.8	6.2	6.2	6.9	6.8	7.4	7.4	5.6	4.8	4.7	5.2	6.0
21	5.0	5.6	5.7	5.7	6.5	6.5	7.2	7.0	5.3	4.7	4.5	4.8	5.7
Day	4.8	5.7	5.7	5.5	6.0	5.8	6.4	6.4	4.7	4.6	4.6	4.9	5.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.9	7.3	3.1	5.4	5.7	1.9	4.2	4.5	5.4	5.0	6.4	7.5	7.4
	2.71	1.90	1.16	1.77	1.52	0.76	1.24	1.48	1.71	1.50	1.92	2.40	1.72
25	11.9	7.9	3.4	5.9	6.2	2.1	4.6	4.9	5.9	5.5	7.0	8.2	8.1
	2.76	1.96	1.19	1.82	1.57	0.78	1.27	1.52	1.77	1.54	1.98	2.47	1.75
50	12.7	8.5	3.7	6.4	6.7	2.3	5.0	5.3	6.4	5.9	7.5	8.8	8.6
	2.83	2.01	1.22	1.87	1.61	0.80	1.31	1.57	1.81	1.58	2.04	2.54	1.79
100	13.6	9.2	4.0	6.9	7.2	2.4	5.4	5.7	6.9	6.4	8.2	9.5	9.3
	2.78	1.96	1.19	1.81	1.56	0.78	1.27	1.52	1.76	1.54	1.97	2.46	1.77
200	14.7	10.2	4.3	7.6	7.9	2.6	5.9	6.3	7.6	7.1	9.0	10.6	10.2
	2.69	1.85	1.13	1.71	1.48	0.75	1.21	1.44	1.66	1.46	1.87	2.33	1.73
Freq	29.8	8.0	2.4	8.6	4.9	1.8	3.4	3.0	6.3	5.6	16.4	9.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.7	3.7	2.8	3.8	3.7	1.4	2.9	3.3	3.7	3.8	4.6	5.9	5.1
	2.38	1.57	1.21	1.45	1.23	0.73	1.09	1.36	1.40	1.37	1.69	1.86	1.54
25	9.0	4.5	3.4	4.5	4.5	1.7	3.5	4.0	4.4	4.5	5.5	7.1	6.1
	2.48	1.69	1.29	1.56	1.32	0.77	1.17	1.47	1.51	1.47	1.82	1.99	1.62
50	10.2	5.3	4.0	5.3	5.3	2.2	4.2	4.7	5.2	5.3	6.3	8.2	7.0
	2.65	1.90	1.45	1.76	1.48	0.85	1.31	1.65	1.69	1.65	2.04	2.21	1.74
100	11.6	6.2	4.8	6.3	6.4	2.7	5.1	5.6	6.2	6.3	7.6	9.6	8.2
	2.85	2.02	1.54	1.87	1.57	0.90	1.39	1.75	1.79	1.76	2.17	2.36	1.85
200	13.7	7.8	5.9	7.8	7.9	3.2	6.2	7.0	7.6	7.8	9.4	11.8	10.0
	2.76	1.93	1.48	1.79	1.50	0.87	1.33	1.67	1.72	1.68	2.08	2.26	1.84
Freq	27.7	5.3	3.3	8.2	4.1	1.9	3.5	3.6	6.3	7.6	15.7	12.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.6	3.2	2.7	3.3	3.2	1.5	2.6	3.0	3.2	3.4	4.0	5.4	4.4
	2.36	1.58	1.28	1.47	1.21	0.80	1.11	1.38	1.42	1.44	1.69	1.87	1.54
25	8.1	4.0	3.3	4.1	4.0	1.9	3.2	3.7	4.0	4.2	4.9	6.6	5.5
	2.45	1.69	1.37	1.57	1.29	0.85	1.19	1.48	1.52	1.54	1.80	1.97	1.61
50	9.3	4.8	3.9	4.9	4.7	2.3	3.9	4.4	4.8	5.0	5.8	7.7	6.4
	2.60	1.87	1.51	1.73	1.43	0.92	1.31	1.63	1.68	1.70	1.99	2.13	1.72
100	10.7	5.7	4.7	5.8	5.7	2.9	4.7	5.3	5.7	6.0	6.9	9.0	7.6
	2.85	2.05	1.66	1.90	1.56	1.00	1.43	1.79	1.85	1.87	2.19	2.35	1.86
200	12.6	7.0	5.8	7.2	7.0	3.5	5.7	6.5	7.0	7.4	8.6	10.9	9.1
	2.76	1.96	1.59	1.82	1.50	0.96	1.37	1.71	1.76	1.79	2.10	2.26	1.84
Freq	25.6	5.0	4.0	7.8	3.8	2.1	3.4	3.9	6.3	8.7	15.0	14.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	2.5	2.2	2.6	2.4	1.4	2.1	2.4	2.5	2.7	3.2	4.4	3.5
	2.28	1.54	1.37	1.42	1.16	0.88	1.15	1.40	1.38	1.45	1.71	1.89	1.53
25	6.7	3.3	3.0	3.4	3.2	1.9	2.8	3.2	3.3	3.6	4.2	5.7	4.6
	2.36	1.63	1.44	1.51	1.22	0.93	1.21	1.48	1.46	1.53	1.81	1.97	1.59
50	7.9	4.0	3.6	4.2	3.9	2.3	3.4	3.8	4.0	4.4	5.1	6.9	5.5
	2.48	1.76	1.57	1.63	1.32	1.00	1.31	1.60	1.58	1.66	1.96	2.09	1.68
100	9.3	4.8	4.4	5.1	4.8	3.0	4.2	4.7	4.9	5.3	6.2	8.2	6.6
	2.69	2.01	1.78	1.86	1.50	1.12	1.48	1.82	1.80	1.89	2.24	2.32	1.83
200	11.0	5.9	5.4	6.2	5.8	3.6	5.1	5.7	5.9	6.5	7.5	9.8	7.9
	2.69	1.94	1.72	1.79	1.45	1.09	1.43	1.76	1.73	1.82	2.15	2.28	1.83
Freq	22.7	4.5	4.9	7.2	3.4	2.4	3.3	4.4	6.2	10.1	13.9	17.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	392	4.6	155	4.0	102	3.1	49
25	7.2	501	5.5	242	4.9	177	4.1	104
50	7.7	600	6.3	333	5.7	256	4.9	167
100	8.3	762	7.3	495	6.7	380	5.9	257
200	9.1	1029	8.9	894	8.1	679	7.0	448

Santa Maria

36° 58′ 00″ N 25° 10′ 00″ W	UTM 26 E 663209 m N 4092812 m	100 m a.s.l.

Location on the western extremity of the island of Sta. Maria (Açôres). The terrain is generally rather flat and very open in most directions close to the station. The anemometer is situated between the runways of the airport with the airport buildings in the E and SE sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	3000	0.00									11	5
30	0.01	3000	0.10	4500	0.00							19	2
60	0.01	500	0.10	8000	0.00							25	-2
90	0.01	550	0.10	1200	0.00							10	-5
120	0.01	1500	0.10									3	-3
150	0.01	4000	0.00									3	3
180	0.01	1500	0.00									10	4
210	0.01	500	0.00									14	1
240	0.01	500	0.00									13	-2
270	0.01	650	0.00									7	-4
300	0.01	1000	0.00									1	-2
330	0.01	2250	0.00									2	3

Height of anemometer: 7.0 m a.g.l. Period: 71010103–80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.3	16	64	104	122	136	132	101	85	89	76	49	19	5	1	6.5	1.89
30	14.4	15	45	68	94	132	157	146	115	99	80	33	10	6	0	6.9	2.35
60	9.9	20	79	106	114	143	151	125	88	75	60	26	9	2	0	6.2	2.15
90	7.0	33	131	170	152	157	128	69	56	42	39	11	5	4	2	5.0	1.67
120	5.9	22	94	137	127	122	122	82	77	66	65	58	24	2	0	6.1	1.72
150	7.4	18	62	97	106	131	126	112	93	91	89	52	13	9	1	6.8	2.02
180	5.5	15	42	68	92	115	138	122	101	97	100	73	25	9	3	7.4	2.09
210	10.8	13	53	96	117	119	136	107	87	81	93	56	27	8	5	6.9	1.86
240	6.7	21	66	119	131	120	134	105	87	82	76	42	11	4	3	6.4	1.91
270	8.1	21	67	119	131	127	114	106	78	69	83	42	26	9	8	6.5	1.70
300	8.9	14	48	92	130	127	129	109	92	80	87	54	23	8	8	6.9	1.84
330	10.0	19	32	72	113	117	128	120	106	111	102	54	18	5	2	7.3	2.26
Total	100.0	18	62	100	117	129	135	112	91	83	80	44	17	6	3	6.6	1.94

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.1	7.4	6.3	6.1	4.6	4.3	4.0	3.9	4.5	5.6	5.7	7.1	5.4
3	7.0	7.3	6.1	5.9	4.6	4.3	3.9	3.7	4.2	5.7	5.7	7.0	5.4
6	7.1	7.3	6.1	5.8	4.7	4.3	3.9	3.8	4.4	5.8	5.8	7.0	5.4
9	7.1	7.2	6.1	6.1	5.1	4.8	4.4	4.2	4.7	5.9	5.7	7.0	5.6
12	7.5	7.6	6.7	6.7	5.8	5.6	5.3	5.0	5.5	6.4	6.5	7.3	6.3
15	7.8	7.9	7.0	7.0	6.0	5.8	5.5	5.3	5.9	6.6	6.6	7.5	6.5
18	7.5	7.8	6.9	7.0	5.9	5.7	5.4	5.2	5.7	6.3	6.0	7.3	6.3
21	7.3	7.4	6.4	6.3	5.0	5.0	4.7	4.3	4.7	5.6	5.7	7.0	5.7
Day	7.3	7.5	6.4	6.4	5.2	5.0	4.6	4.4	4.9	6.0	6.0	7.2	5.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	7.3	6.8	5.8	8.6	8.2	7.9	6.9	6.5	7.1	7.9	8.4	7.4
	2.04	2.34	2.14	1.76	1.89	2.00	2.05	1.88	1.91	1.73	1.83	2.20	1.93
25	8.1	7.9	7.4	6.4	9.3	9.0	8.7	7.6	7.1	7.7	8.6	9.2	8.1
	2.10	2.41	2.21	1.81	1.93	2.05	2.11	1.94	1.97	1.78	1.87	2.27	1.98
50	8.7	8.5	8.0	6.9	10.0	9.6	9.3	8.2	7.6	8.3	9.3	9.9	8.7
	2.16	2.47	2.27	1.86	1.98	2.11	2.17	1.99	2.03	1.83	1.93	2.33	2.03
100	9.5	9.3	8.7	7.4	10.7	10.4	10.1	8.8	8.3	9.0	10.0	10.7	9.4
	2.09	2.40	2.20	1.80	1.94	2.05	2.10	1.92	1.96	1.77	1.88	2.26	1.98
200	10.5	10.2	9.6	8.2	11.6	11.4	11.1	9.8	9.1	9.9	10.9	11.8	10.4
	1.98	2.27	2.08	1.71	1.87	1.96	1.99	1.82	1.86	1.68	1.79	2.15	1.89
Freq	6.6	12.3	9.0	7.4	6.8	8.0	6.0	9.4	6.4	7.9	9.7	10.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	5.0	4.6	4.1	6.2	5.7	5.2	4.7	4.5	5.0	5.6	5.8	5.1
	1.75	1.95	1.73	1.35	1.75	1.73	1.67	1.59	1.57	1.47	1.63	1.85	1.64
25	6.0	6.0	5.5	5.0	7.3	6.8	6.3	5.7	5.5	6.0	6.7	6.9	6.2
	1.89	2.10	1.87	1.46	1.84	1.86	1.80	1.72	1.69	1.58	1.74	2.00	1.76
50	7.0	6.9	6.4	5.8	8.3	7.8	7.3	6.6	6.4	6.9	7.7	8.0	7.1
	2.12	2.37	2.10	1.63	1.98	2.06	2.02	1.93	1.90	1.76	1.92	2.24	1.96
100	8.3	8.2	7.6	7.0	9.6	9.2	8.7	7.9	7.6	8.3	9.0	9.5	8.4
	2.26	2.52	2.23	1.74	2.13	2.20	2.15	2.06	2.03	1.88	2.06	2.38	2.09
200	10.3	10.2	9.4	8.6	11.4	11.4	10.8	9.8	9.4	10.2	11.0	11.7	10.4
	2.16	2.40	2.13	1.66	2.05	2.11	2.06	1.96	1.94	1.80	1.97	2.28	2.01
Freq	7.5	12.0	8.6	7.1	7.1	7.7	6.6	9.0	6.5	8.3	9.9	9.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.3	3.9	3.7	5.4	4.9	4.5	4.1	4.0	4.4	4.9	5.0	4.5
	1.79	1.94	1.69	1.34	1.79	1.74	1.67	1.57	1.53	1.50	1.67	1.84	1.64
25	5.4	5.4	4.9	4.6	6.6	6.1	5.6	5.1	4.9	5.4	6.0	6.2	5.5
	1.92	2.08	1.81	1.43	1.87	1.85	1.78	1.68	1.64	1.60	1.76	1.96	1.75
50	6.4	6.3	5.7	5.5	7.6	7.1	6.6	6.0	5.8	6.4	7.1	7.2	6.5
	2.12	2.30	2.00	1.58	2.00	2.03	1.98	1.86	1.81	1.76	1.92	2.17	1.92
100	7.6	7.5	6.8	6.6	8.9	8.4	7.8	7.2	6.9	7.7	8.4	8.6	7.7
	2.33	2.53	2.20	1.74	2.19	2.23	2.17	2.04	1.99	1.93	2.11	2.38	2.11
200	9.4	9.2	8.4	8.1	10.5	10.3	9.7	8.8	8.5	9.4	10.1	10.6	9.5
	2.23	2.42	2.11	1.66	2.12	2.14	2.08	1.95	1.90	1.85	2.03	2.28	2.03
Freq	8.1	11.6	8.4	7.0	7.2	7.5	7.0	8.7	6.7	8.4	10.0	9.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.4	3.0	3.0	4.2	3.9	3.5	3.2	3.1	3.5	3.9	3.9	3.5
	1.86	1.94	1.65	1.32	1.83	1.74	1.66	1.60	1.52	1.53	1.70	1.83	1.65
25	4.5	4.5	4.0	4.0	5.5	5.1	4.6	4.3	4.2	4.6	5.1	5.1	4.6
	1.97	2.06	1.76	1.40	1.91	1.83	1.76	1.69	1.61	1.61	1.79	1.94	1.74
50	5.5	5.4	4.9	4.9	6.6	6.1	5.6	5.2	5.1	5.6	6.2	6.2	5.6
	2.14	2.24	1.90	1.51	2.03	1.98	1.90	1.83	1.74	1.74	1.92	2.10	1.88
100	6.6	6.5	5.9	6.0	7.8	7.4	6.7	6.3	6.1	6.8	7.4	7.5	6.8
	2.44	2.55	2.17	1.72	2.24	2.25	2.17	2.09	1.98	1.98	2.18	2.40	2.13
200	8.1	7.9	7.2	7.3	9.4	9.0	8.2	7.6	7.5	8.3	8.9	9.1	8.2
	2.35	2.46	2.09	1.66	2.21	2.17	2.09	2.01	1.91	1.91	2.11	2.31	2.07
Freq	8.9	11.1	8.3	6.9	7.3	7.2	7.5	8.3	6.9	8.6	10.0	8.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	345	4.6	141	4.0	93	3.1	45
25	7.2	440	5.5	220	4.9	161	4.1	95
50	7.7	529	6.3	301	5.8	232	5.0	153
100	8.4	690	7.5	465	6.8	355	6.0	236
200	9.2	969	9.2	908	8.4	679	7.3	438

Sines

37° 57′ 00″ N 08° 53′ 00″ W	UTM 29 E 510250 m N 4200343 m	15 m a.s.l.

The station is located on an irregular promontory bounded to the SW, W, N and NE by the Atlantic Ocean. The land surface is flat and there are buildings in the sector ENE to SE through E. The anemometer is situated 4.5 m above a 3.5-m high hut (3 × 3 × 3.5 m).

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	50	0.00									7	1
30	0.01	600	0.004	1500	0.00							7	-2
60	0.03	50	0.40	100	0.20							3	-5
90	0.03	40	0.40	100	0.20							-4	-2
120	0.03	50	0.40	100	0.20	1200	0.00					-3	2
150	0.03	50	0.40	100	0.20	800	0.00					4	4
180	0.03	50	0.40	100	0.10	300	0.00					8	1
210	0.03	50	0.00									6	-2
240	0.01	50	0.00									2	-3
270	0.01	50	0.00									-2	-1
300	0.01	50	0.00									-2	2
330	0.01	50	0.00									3	3

Height of anemometer: 8.0 m a.g.l. Period: 71010103–80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	18.1	33	96	131	143	117	116	121	79	63	73	21	5	2	0	5.9	1.99
30	11.9	53	123	187	209	160	123	81	24	19	19	0	0	0	0	4.4	2.00
60	4.0	91	199	317	220	127	26	12	6	2	1	0	0	0	0	3.1	2.13
90	2.8	174	237	233	156	100	63	28	6	2	0	0	2	0	0	3.0	1.61
120	4.9	136	157	279	200	122	58	32	10	4	2	0	0	0	0	3.3	1.86
150	5.1	96	216	286	207	89	62	36	7	0	2	0	0	0	0	3.2	1.86
180	7.7	77	144	172	196	108	110	65	42	49	25	7	3	2	1	4.3	1.50
210	6.2	65	111	171	152	109	99	124	50	36	60	19	2	2	0	5.1	1.69
240	4.6	123	133	119	115	113	129	90	56	70	37	14	1	1	0	5.1	1.81
270	4.6	133	146	161	161	94	86	86	63	34	22	11	1	1	0	4.2	1.52
300	8.4	79	80	165	156	132	134	91	47	46	55	9	6	0	0	5.1	1.81
330	21.8	20	49	84	115	116	140	153	102	112	81	22	4	1	0	6.7	2.61
Total	100.0	65	114	162	160	120	111	98	56	53	46	12	3	1	0	5.0	1.75

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	6.9	5.9	4.8	3.5	–	–	–	–	2.4	–	5.2
3	–	–	6.7	5.8	4.0	2.9	–	–	–	–	–	–	5.1
6	4.4	5.1	4.7	4.4	4.2	3.4	3.4	3.0	2.7	3.4	4.0	4.6	4.0
9	4.2	4.9	4.5	4.3	4.0	3.4	3.3	2.9	2.8	3.6	3.7	4.6	3.9
12	4.7	5.4	4.8	4.9	4.7	4.1	4.1	3.9	3.3	3.9	3.9	4.6	4.4
15	4.9	5.8	5.6	5.7	5.9	5.1	5.3	4.9	3.9	4.5	4.4	4.9	5.1
18	4.8	5.5	5.6	5.9	6.0	5.1	5.4	5.1	4.1	4.5	4.2	4.8	5.1
21	3.8	3.8	5.5	5.2	5.5	4.7	4.7	5.1	3.2	4.1	3.9	4.4	4.6
Day	4.6	5.3	5.1	5.1	5.0	4.2	4.3	4.0	3.3	4.0	4.0	4.7	4.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	4.8	6.4	6.3	5.1	4.6	4.9	4.9	5.1	4.6	5.6	6.6	5.6
	2.02	1.96	2.20	2.01	1.85	1.69	1.58	1.68	1.79	1.56	1.88	2.54	1.94
25	6.3	5.2	7.0	6.9	5.6	5.1	5.4	5.4	5.6	5.0	6.1	7.2	6.1
	2.08	2.02	2.28	2.08	1.91	1.74	1.63	1.74	1.85	1.60	1.94	2.62	1.99
50	6.7	5.6	7.5	7.4	6.0	5.5	5.8	5.8	6.0	5.4	6.6	7.7	6.6
	2.14	2.07	2.33	2.13	1.96	1.79	1.67	1.78	1.89	1.65	1.99	2.69	2.04
100	7.3	6.1	8.2	8.0	6.5	5.9	6.3	6.3	6.5	5.8	7.1	8.4	7.1
	2.07	2.01	2.26	2.06	1.90	1.73	1.62	1.73	1.83	1.60	1.93	2.60	1.98
200	8.0	6.7	9.0	8.9	7.2	6.5	6.9	6.9	7.2	6.4	7.9	9.3	7.8
	1.96	1.90	2.14	1.96	1.80	1.64	1.53	1.63	1.74	1.51	1.83	2.47	1.88
Freq	17.0	11.1	5.2	3.4	5.2	5.3	6.9	5.9	4.8	5.0	9.6	20.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.4	4.6	4.2	3.5	3.2	3.4	3.4	3.5	3.3	4.1	4.5	3.9
	1.65	1.65	1.83	1.69	1.56	1.38	1.36	1.44	1.46	1.40	1.73	2.04	1.63
25	4.6	4.1	5.5	5.0	4.2	3.9	4.1	4.1	4.2	4.1	4.9	5.4	4.6
	1.77	1.77	1.98	1.82	1.69	1.49	1.46	1.55	1.57	1.50	1.87	2.20	1.76
50	5.3	4.7	6.3	5.8	4.8	4.5	4.8	4.8	4.9	4.7	5.7	6.2	5.4
	1.99	1.99	2.22	2.04	1.89	1.67	1.64	1.74	1.76	1.69	2.10	2.47	1.97
100	6.3	5.6	7.5	6.9	5.8	5.4	5.8	5.7	5.8	5.7	6.8	7.4	6.4
	2.12	2.12	2.37	2.17	2.01	1.78	1.74	1.85	1.87	1.79	2.24	2.63	2.09
200	7.9	6.9	9.4	8.6	7.2	6.7	7.1	7.1	7.2	7.0	8.5	9.2	8.0
	2.03	2.03	2.26	2.08	1.92	1.70	1.67	1.77	1.79	1.71	2.13	2.52	2.00
Freq	15.5	9.5	4.6	3.7	5.4	5.6	6.8	5.6	4.8	5.9	12.0	20.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.0	4.0	3.6	3.0	2.8	2.9	3.0	3.0	3.0	3.7	3.9	3.4
	1.63	1.62	1.88	1.69	1.53	1.37	1.31	1.45	1.45	1.42	1.78	1.99	1.63
25	4.1	3.7	5.0	4.4	3.7	3.5	3.6	3.7	3.7	3.7	4.5	4.8	4.2
	1.74	1.73	2.01	1.81	1.63	1.47	1.40	1.55	1.55	1.52	1.91	2.13	1.74
50	4.8	4.3	5.8	5.2	4.3	4.1	4.3	4.4	4.4	4.4	5.3	5.6	4.9
	1.92	1.91	2.22	2.01	1.81	1.62	1.55	1.71	1.71	1.68	2.11	2.36	1.92
100	5.7	5.2	6.9	6.3	5.2	5.0	5.2	5.3	5.3	5.3	6.3	6.7	5.9
	2.11	2.10	2.45	2.20	1.98	1.77	1.70	1.88	1.88	1.84	2.32	2.59	2.10
200	7.1	6.4	8.6	7.7	6.4	6.1	6.4	6.5	6.5	6.5	7.8	8.3	7.2
	2.02	2.01	2.34	2.11	1.90	1.70	1.63	1.80	1.80	1.76	2.22	2.48	2.01
Freq	15.0	8.9	4.5	3.9	5.4	5.8	6.7	5.5	4.8	6.3	13.0	20.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	2.5	3.1	2.8	2.3	2.3	2.4	2.4	2.3	2.4	2.9	3.0	2.7
	1.63	1.65	1.85	1.75	1.56	1.40	1.39	1.44	1.41	1.48	1.84	1.92	1.64
25	3.4	3.2	4.1	3.7	3.1	3.0	3.1	3.2	3.1	3.2	3.9	4.0	3.5
	1.73	1.74	1.96	1.86	1.65	1.48	1.47	1.52	1.50	1.57	1.95	2.04	1.74
50	4.1	3.9	5.0	4.5	3.8	3.6	3.8	3.8	3.7	3.9	4.7	4.8	4.3
	1.87	1.90	2.13	2.02	1.79	1.61	1.60	1.65	1.62	1.70	2.12	2.21	1.88
100	5.0	4.7	6.0	5.4	4.6	4.4	4.7	4.7	4.5	4.8	5.7	5.8	5.2
	2.13	2.16	2.42	2.30	2.04	1.83	1.81	1.88	1.85	1.94	2.41	2.52	2.13
200	6.1	5.8	7.4	6.6	5.6	5.4	5.7	5.7	5.5	5.8	6.9	7.0	6.3
	2.06	2.08	2.33	2.21	1.96	1.76	1.75	1.81	1.78	1.87	2.33	2.43	2.06
Freq	14.2	8.1	4.3	4.2	5.3	6.0	6.6	5.3	4.9	7.0	14.4	19.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.9	146	3.4	60	3.0	40	2.4	19
25	5.4	185	4.1	94	3.7	69	3.1	41
50	5.8	224	4.8	129	4.3	100	3.8	67
100	6.3	295	5.7	204	5.2	155	4.6	104
200	7.0	421	7.1	410	6.4	304	5.6	196

Viana do Castelo

41° 42′ 00″ N	08° 48′ 00″ W	UTM 29	E 516641 m	N 4616569 m	16 m a.s.l.

Location on the Atlantic coast in the NW part of Portugal. There are hills and mountains in the land sectors. The terrain close to the anemometer is flat and has an open appearance except for the sector 330°-90°. The anemometer is situated 4.2 m above the roof of the weather station which is 6.9 m high.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.40											-18	7
30	0.40											-4	8
60	0.30											5	2
90	0.30											1	-6
120	0.10	300	0.30	1500	0.00	3000	0.30					-14	-7
150	0.10	1000	0.00	2200	0.30							-21	-1
180	0.10	200	0.40	500	0.15	1000	0.00	2000	0.30			-16	7
210	0.10	200	0.40	1500	0.025	4000	0.00					-4	6
240	0.40	3750	0.00									4	2
270	0.10	100	0.40	4000	0.00							1	-5
300	0.10	100	0.40	7000	0.00							-12	-8
330	0.30											-22	-2

Height of anemometer: 11.0 m a.g.l. Period: 71010103-80093021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	10.8	319	161	123	134	117	72	45	19	6	2	0	1	0	0	3.0	1.44
30	13.5	439	247	133	81	51	27	14	6	3	0	0	0	0	0	1.8	1.11
60	11.7	390	247	161	103	57	27	9	3	1	0	0	0	0	0	2.0	1.28
90	6.7	451	252	155	69	39	22	4	4	2	2	0	0	0	0	1.7	1.14
120	4.8	441	281	141	58	40	30	10	1	0	0	0	0	0	0	1.7	1.16
150	3.8	471	246	141	68	37	20	12	2	3	0	0	0	0	0	1.7	1.11
180	5.6	281	179	104	74	66	80	74	46	40	41	10	3	0	0	3.7	1.24
210	8.8	227	175	133	124	118	82	49	32	36	16	6	1	0	0	3.7	1.43
240	10.4	208	170	168	163	114	72	49	27	14	10	4	1	0	0	3.5	1.52
270	6.8	277	169	159	153	101	65	26	21	18	10	2	0	0	0	3.1	1.41
300	7.9	266	170	154	163	132	69	30	8	3	3	0	1	0	0	3.1	1.63
330	9.3	310	167	116	120	120	77	47	27	13	2	0	0	0	0	3.1	1.44
Total	100.0	335	203	141	114	87	54	31	16	11	6	2	1	0	0	2.6	1.22

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.3	2.4	1.9	2.0	1.9	1.6	1.3	1.2	1.3	1.5	1.5	2.3	1.8
3	2.2	3.2	1.9	1.9	1.4	1.4	1.2	0.9	0.9	1.2	1.0	2.7	1.7
6	2.2	2.4	1.7	1.6	1.5	1.1	1.0	1.0	1.1	1.4	1.4	2.1	1.5
9	2.3	2.7	1.9	2.4	2.2	2.2	1.9	1.5	1.4	1.6	1.2	2.6	1.9
12	2.8	3.1	3.2	3.6	4.0	3.7	3.5	3.5	3.2	2.8	2.4	2.7	3.2
15	3.1	4.4	4.3	4.4	4.6	4.7	4.2	4.3	3.4	3.3	2.6	3.7	3.9
18	2.5	3.0	3.1	3.5	3.6	3.5	3.2	3.1	2.5	1.9	1.8	2.4	2.8
21	2.3	3.0	2.4	2.4	2.2	1.8	1.4	1.4	1.1	1.5	1.2	2.8	1.9
Day	2.5	2.9	2.5	2.7	2.7	2.5	2.2	2.1	1.9	1.9	1.7	2.5	2.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.0	4.7	3.8	3.5	3.4	3.6	6.4	6.0	5.5	5.2	5.9	7.6	5.3
	1.51	1.29	1.42	1.38	1.34	1.19	1.22	1.31	1.48	1.44	1.51	1.63	1.29
25	7.7	5.2	4.2	3.8	3.7	4.0	7.0	6.6	6.1	5.8	6.4	8.3	5.8
	1.54	1.33	1.46	1.43	1.38	1.23	1.23	1.34	1.52	1.48	1.55	1.66	1.31
50	8.2	5.6	4.5	4.1	4.0	4.3	7.5	7.1	6.6	6.2	6.9	8.9	6.3
	1.58	1.37	1.49	1.46	1.42	1.26	1.26	1.37	1.56	1.52	1.59	1.71	1.35
100	8.8	6.1	4.8	4.4	4.3	4.6	8.0	7.6	7.1	6.7	7.5	9.5	6.7
	1.55	1.32	1.45	1.42	1.37	1.22	1.25	1.34	1.51	1.47	1.54	1.68	1.33
200	9.5	6.6	5.3	4.9	4.7	5.0	8.5	8.2	7.8	7.3	8.3	10.3	7.3
	1.50	1.26	1.37	1.35	1.30	1.16	1.22	1.29	1.43	1.40	1.46	1.62	1.29
Freq	12.7	12.4	10.1	7.0	5.7	5.2	6.4	7.9	8.4	6.6	7.3	10.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	2.8	2.6	2.3	2.3	2.5	5.2	3.9	3.7	3.5	4.1	5.4	3.6
	1.30	1.10	1.26	1.16	1.15	1.01	1.24	1.18	1.26	1.19	1.30	1.44	1.15
25	5.6	3.4	3.1	2.8	2.8	3.0	6.2	4.7	4.5	4.2	5.0	6.4	4.4
	1.36	1.18	1.36	1.24	1.24	1.08	1.27	1.26	1.36	1.28	1.40	1.50	1.21
50	6.4	4.0	3.7	3.4	3.3	3.6	7.0	5.6	5.3	5.0	5.8	7.3	5.1
	1.46	1.31	1.52	1.39	1.38	1.20	1.33	1.42	1.52	1.44	1.56	1.60	1.31
100	7.4	4.8	4.4	4.0	4.0	4.3	7.9	6.6	6.4	6.0	7.0	8.5	6.1
	1.57	1.40	1.62	1.48	1.47	1.27	1.42	1.50	1.62	1.52	1.67	1.72	1.40
200	8.8	6.0	5.4	5.0	5.0	5.4	9.0	8.2	7.9	7.4	8.6	9.9	7.4
	1.51	1.34	1.54	1.42	1.40	1.22	1.38	1.44	1.55	1.46	1.59	1.66	1.38
Freq	13.2	12.1	9.3	6.2	5.6	5.0	6.8	8.3	8.4	6.0	7.8	11.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	2.4	2.2	2.0	2.0	2.2	4.6	3.3	3.3	3.0	3.6	4.8	3.2
	1.28	1.14	1.25	1.14	1.13	0.99	1.26	1.21	1.27	1.19	1.30	1.44	1.15
25	4.9	3.0	2.8	2.5	2.5	2.8	5.6	4.2	4.1	3.8	4.5	5.8	4.0
	1.33	1.22	1.34	1.21	1.21	1.06	1.29	1.28	1.35	1.26	1.39	1.49	1.21
50	5.7	3.6	3.3	3.0	3.0	3.4	6.5	5.0	4.8	4.5	5.3	6.8	4.7
	1.42	1.34	1.48	1.34	1.33	1.16	1.35	1.42	1.49	1.39	1.53	1.58	1.29
100	6.7	4.3	4.0	3.7	3.7	4.1	7.5	6.0	5.8	5.5	6.4	7.8	5.6
	1.56	1.47	1.62	1.46	1.46	1.27	1.44	1.55	1.63	1.52	1.68	1.73	1.40
200	7.9	5.3	4.8	4.5	4.5	5.0	8.6	7.3	7.2	6.7	7.9	9.2	6.7
	1.51	1.41	1.55	1.40	1.40	1.22	1.42	1.49	1.57	1.46	1.61	1.67	1.38
Freq	13.6	12.0	8.9	6.0	5.6	5.0	7.1	8.3	8.3	5.8	7.9	11.7	100.0

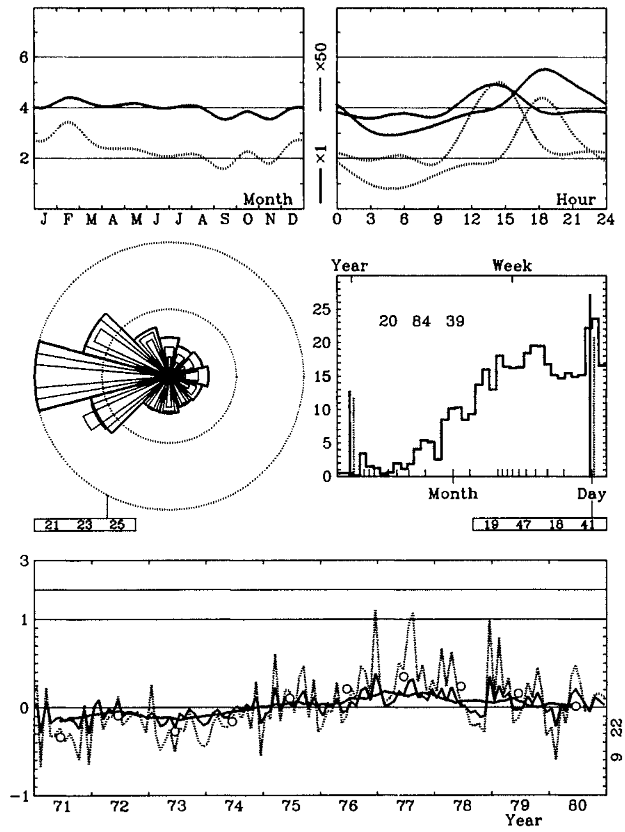
Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	1.8	1.8	1.6	1.6	1.9	3.5	2.6	2.5	2.5	2.9	3.7	2.5
	1.24	1.14	1.28	1.16	1.13	0.95	1.26	1.22	1.26	1.21	1.26	1.42	1.15
25	3.9	2.5	2.4	2.2	2.2	2.5	4.6	3.5	3.4	3.3	3.8	4.8	3.3
	1.29	1.21	1.35	1.23	1.20	0.99	1.29	1.29	1.34	1.27	1.34	1.46	1.20
50	4.7	3.0	2.9	2.7	2.7	3.0	5.4	4.3	4.2	4.0	4.7	5.7	4.0
	1.37	1.30	1.47	1.33	1.29	1.04	1.33	1.39	1.45	1.38	1.45	1.53	1.27
100	5.7	3.7	3.5	3.3	3.3	3.7	6.4	5.2	5.1	4.9	5.7	6.8	4.9
	1.50	1.48	1.67	1.51	1.47	1.15	1.41	1.58	1.65	1.57	1.64	1.66	1.39
200	6.7	4.5	4.3	4.0	4.0	4.5	7.5	6.4	6.2	6.0	7.0	8.0	5.9
	1.48	1.42	1.60	1.46	1.41	1.13	1.43	1.52	1.58	1.51	1.58	1.66	1.39
Freq	13.5	11.6	8.4	5.9	5.5	5.2	7.3	8.3	8.0	6.1	8.3	11.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.9	252	3.5	112	3.0	74	2.4	35
25	5.4	318	4.1	169	3.7	124	3.1	74
50	5.7	374	4.7	221	4.3	172	3.7	114
100	6.2	484	5.5	314	5.1	243	4.5	166
200	6.8	671	6.7	579	6.2	439	5.4	291

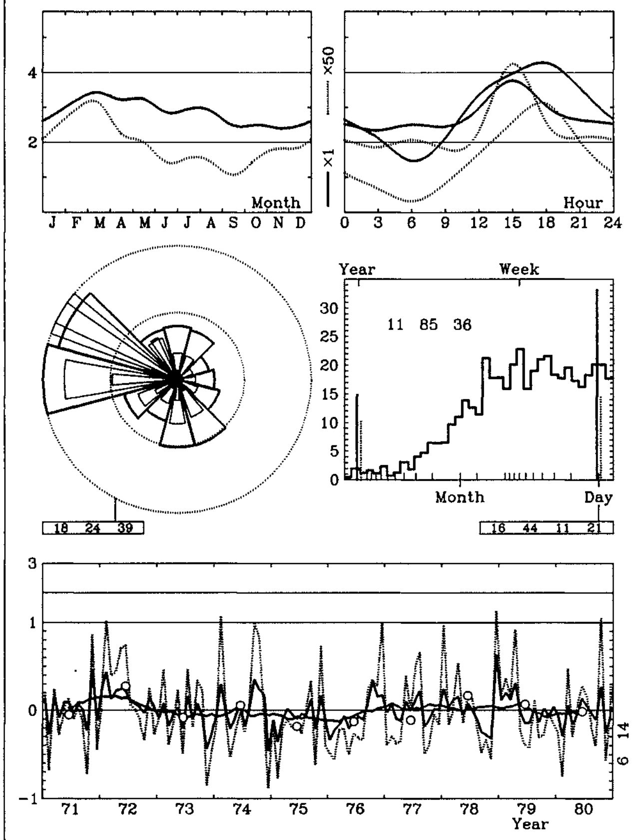
Beja, Portugal 1971–80

10.0 m agl, mean 4.0 m/s, st dev 2.0 m/s, cube 117. m^3/s^3



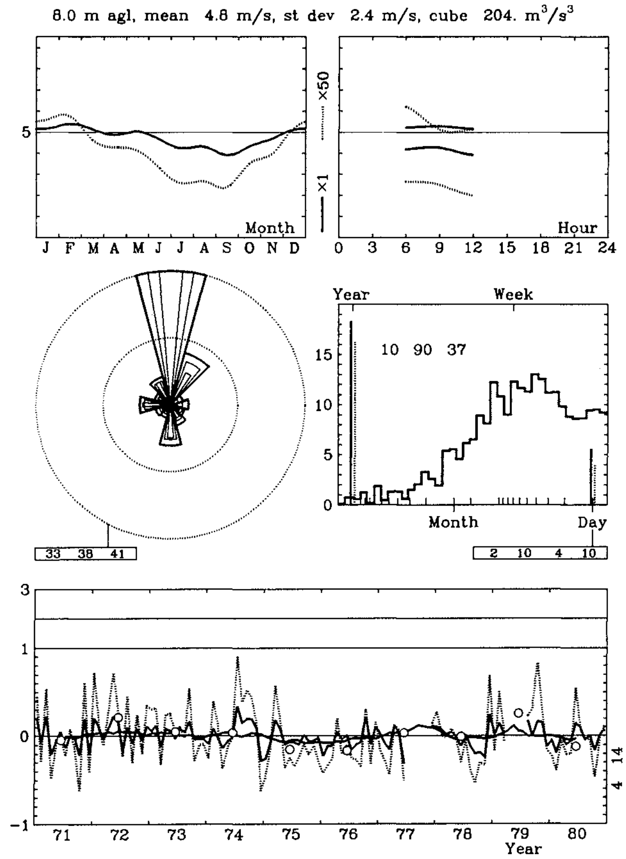
Bragança, Portugal 1971–80

9.0 m agl, mean 2.9 m/s, st dev 2.5 m/s, cube 97. m^3/s^3



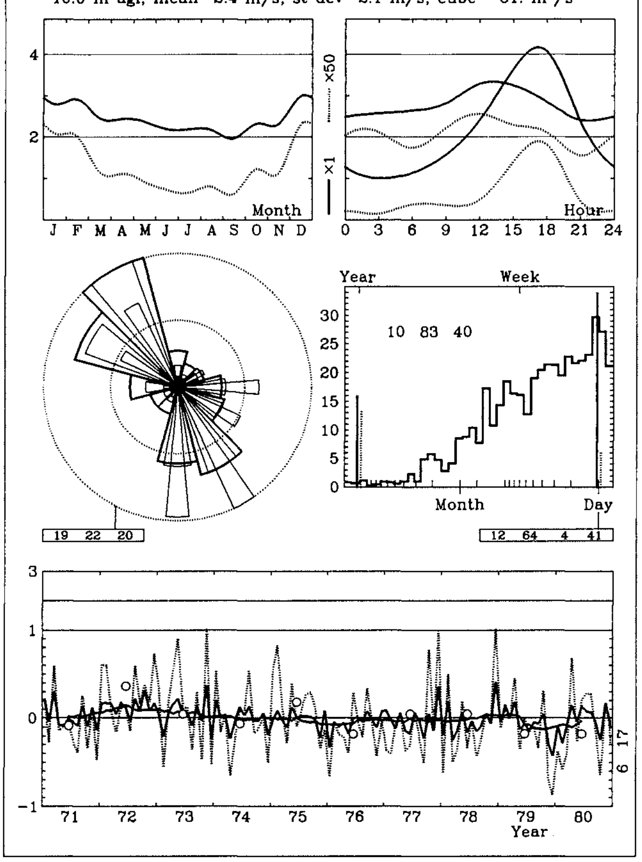
Cabo Carvoeiro, Portugal 1971–80

8.0 m agl, mean 4.8 m/s, st dev 2.4 m/s, cube 204. m^3/s^3



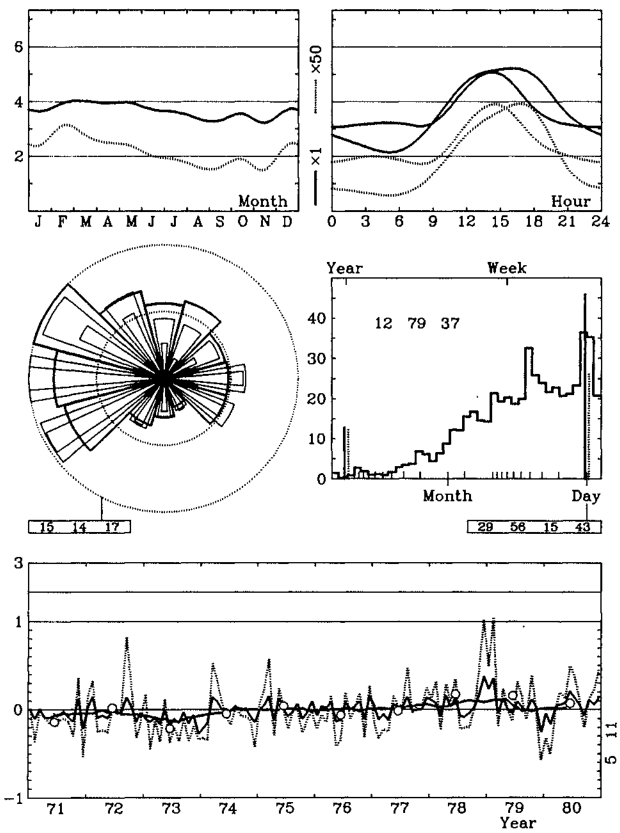
Coimbra, Portugal 1971–80

10.0 m agl, mean 2.4 m/s, st dev 2.1 m/s, cube 61. m^3/s^3



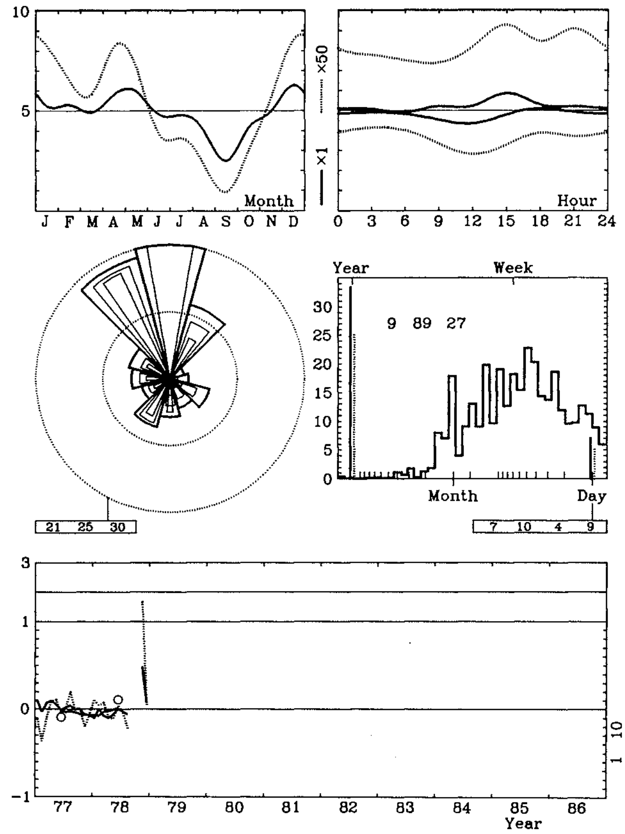
Faro, Portugal 1971–80

7.0 m agl, mean 3.7 m/s, st dev 2.2 m/s, cube 109. m^3/s^3



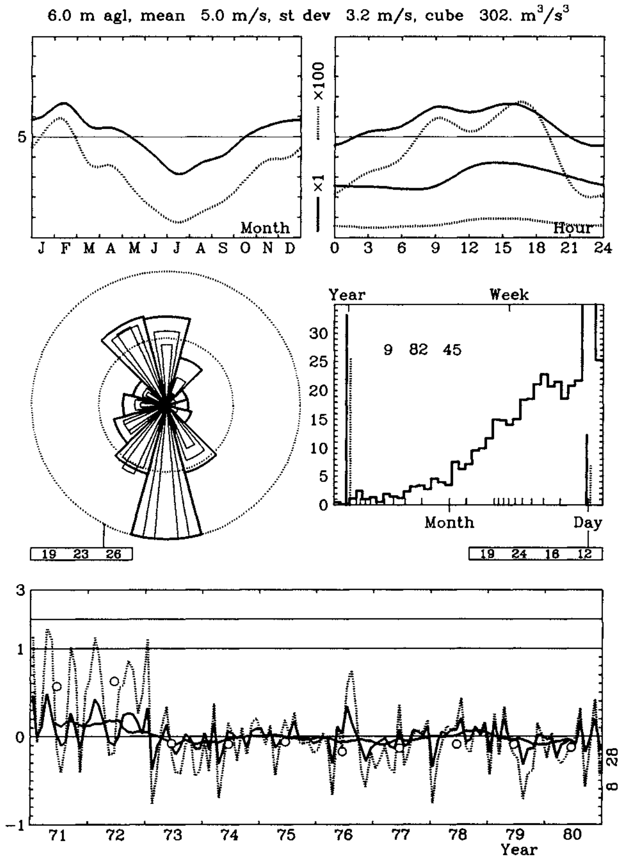
Ferrel, Portugal 1977–78

10.0 m agl, mean 5.0 m/s, st dev 3.0 m/s, cube 277. m^3/s^3



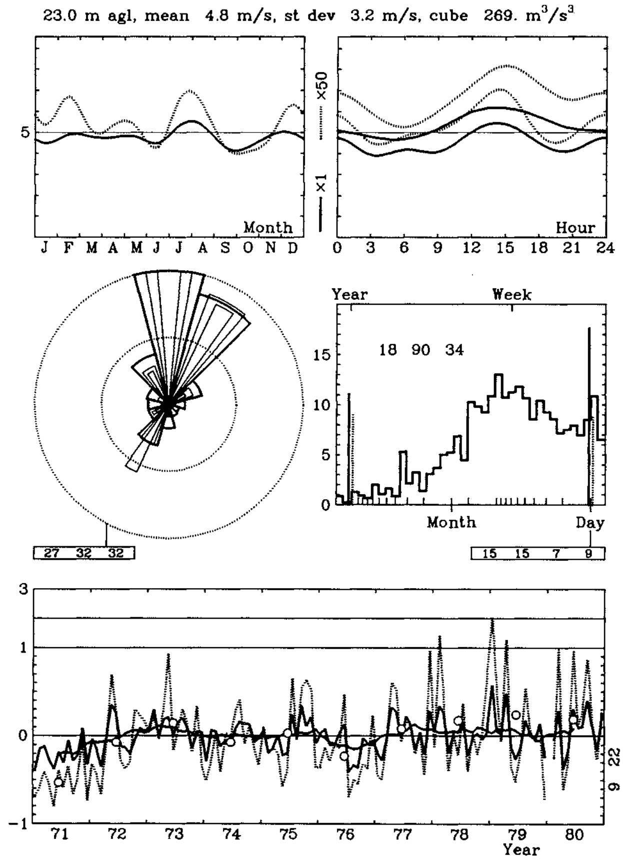
Flores Azores, Portugal 1971–80

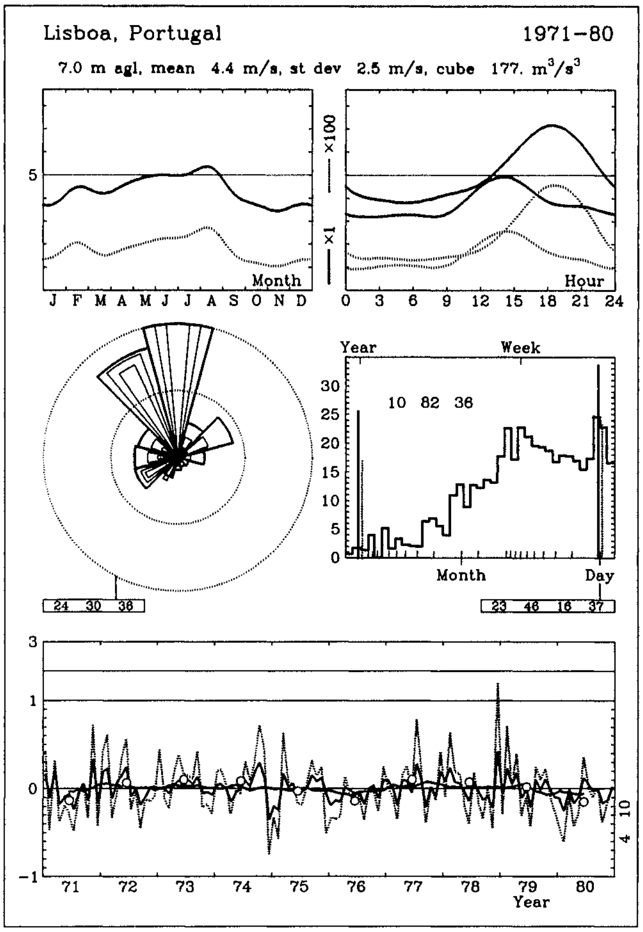
6.0 m agl, mean 5.0 m/s, st dev 3.2 m/s, cube 302. m^3/s^3

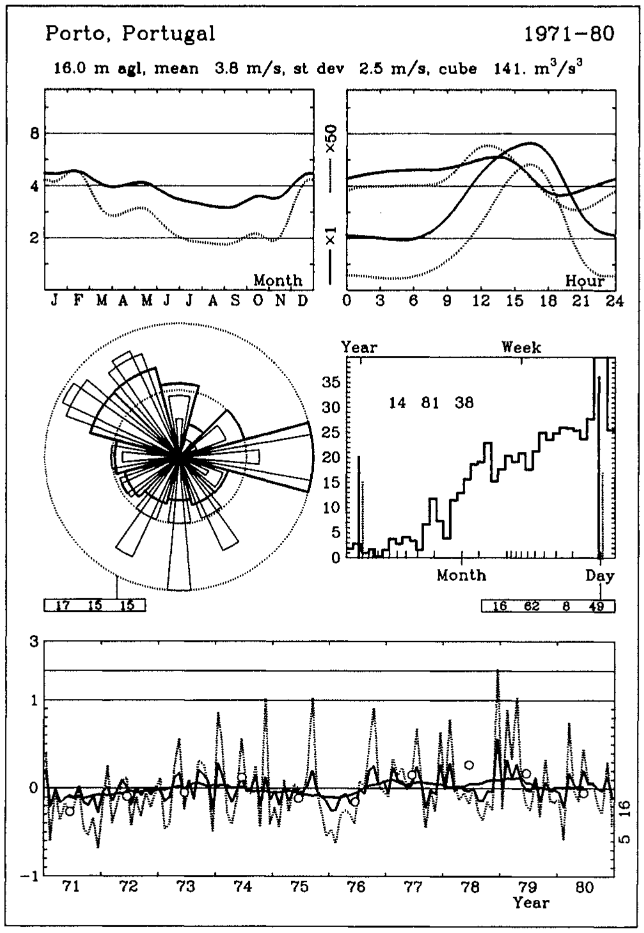


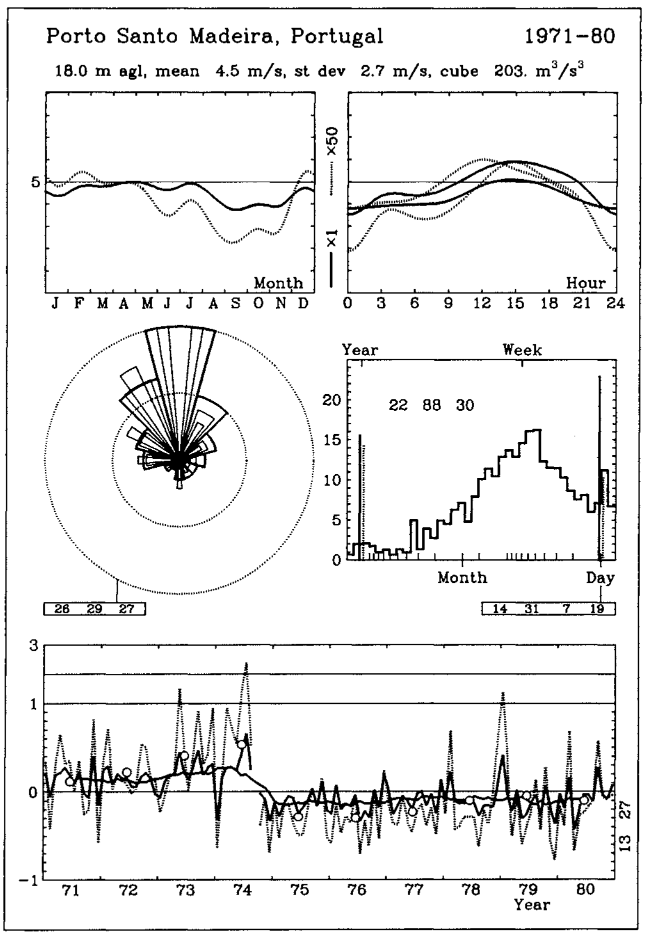
Funchal Madeira, Portugal 1971–80

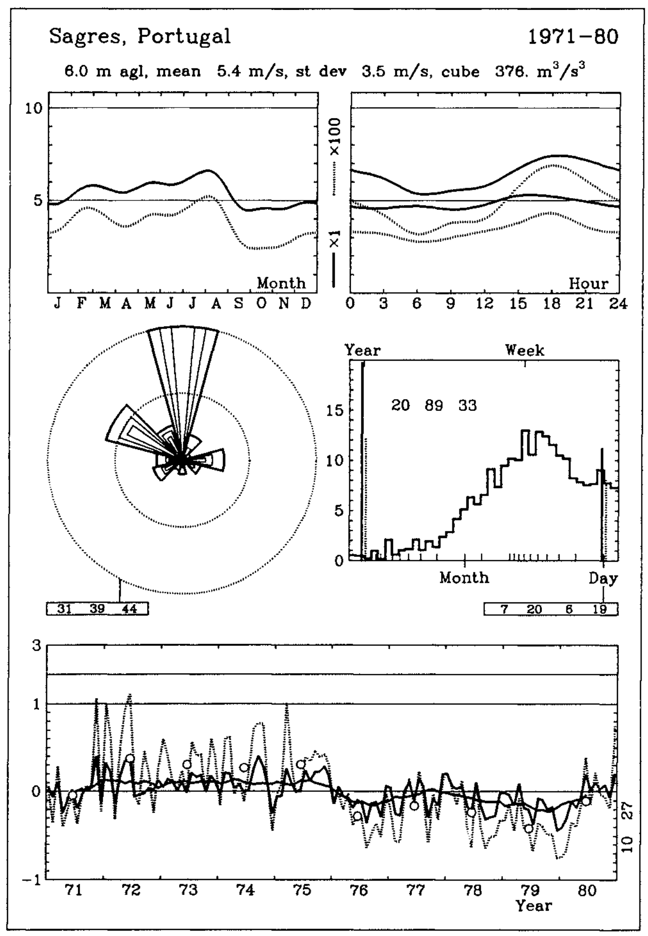
23.0 m agl, mean 4.8 m/s, st dev 3.2 m/s, cube 269. m^3/s^3




Lisboa, Portugal 1971–80
7.0 m agl, mean 4.4 m/s, st dev 2.5 m/s, cube 177. m^3/s^3
Month
Hour
Year
Week
Month
Day
Year

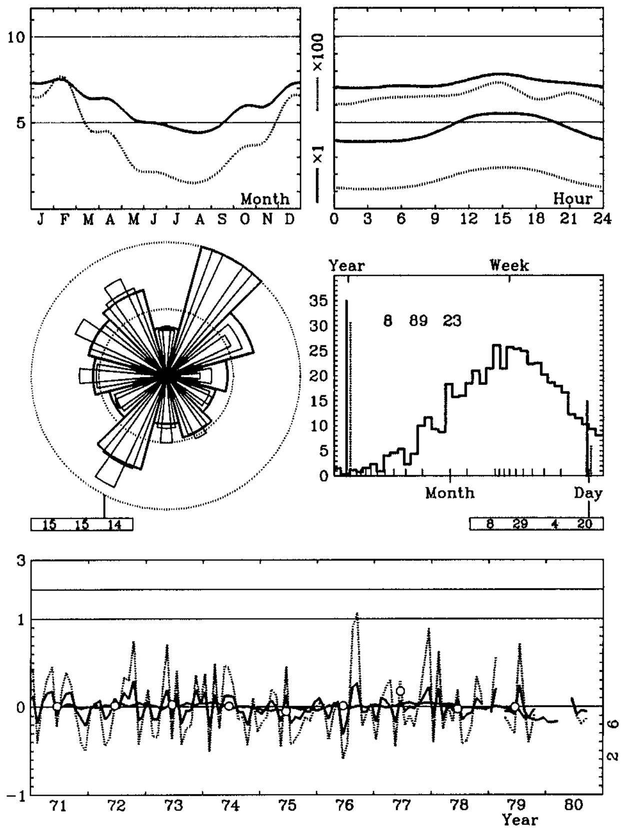

Porto, Portugal 1971–80
16.0 m agl, mean 3.8 m/s, st dev 2.5 m/s, cube 141. m^3/s^3
Month
Hour
Year
Week
Month
Day
Year


Porto Santo Madeira, Portugal 1971–80
18.0 m agl, mean 4.5 m/s, st dev 2.7 m/s, cube 203. m^3/s^3
Month
Hour
Year
Week
Month
Day
Year


Sagres, Portugal 1971–80
6.0 m agl, mean 5.4 m/s, st dev 3.5 m/s, cube 376. m^3/s^3
Month
Hour
Year
Week
Month
Day
Year

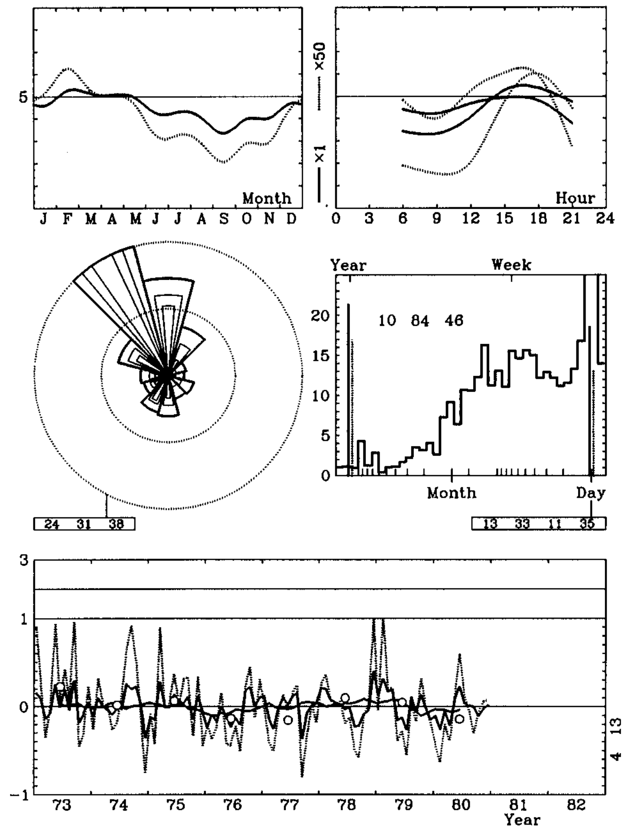
Santa Maria Azores, Portugal 1971–80

7.0 m agl, mean 5.8 m/s, st dev 3.1 m/s, cube 382. m^3/s^3



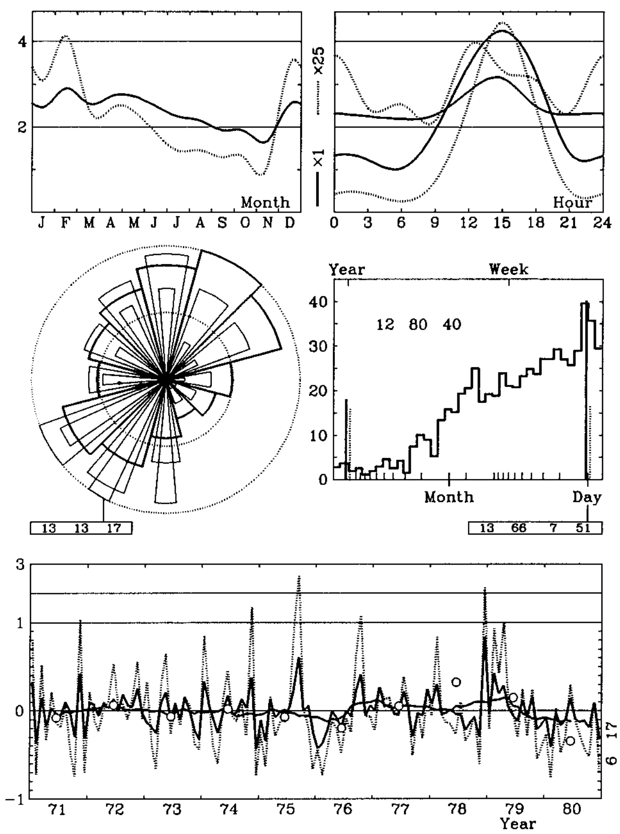
Sines, Portugal 1973–80

8.0 m agl, mean 4.5 m/s, st dev 2.7 m/s, cube 202. m^3/s^3



Viana do Castelo, Portugal 1971–80

11.0 m agl, mean 2.3 m/s, st dev 2.1 m/s, cube 54. m^3/s^3



Albacete

38° 56′ 00″ N	01° 51′ 00″ W	UTM 30	E 599679 m	N 4310080 m	700 m a.s.l.

Location on the great plain of Los Llanos which is at an elevation of 600-800 m a.s.l. The plain is bordered by the mountains Altos de Chinchilla - found more than 10 km E of the station - and by the foothills of Sierra de Alcaraz - more than 20 km S of the station.
The anemometer is situated near the runways of the airport Base Aérea de Los Llanos, 4 km S of the city of Albacete. The nearest buildings appear in the NW sector at distances greater than 550 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	250	0.10	3500	0.30								
30	0.01	500	0.10	2000	0.20								
60	0.01	500	0.10										
90	0.01	500	0.10										
120	0.01	1500	0.10										
150	0.01	2000	0.10										
180	0.01	2000	0.10										
210	0.01	2000	0.20										
240	0.01	3000	0.20										
270	0.01	2000	0.15										
300	0.01	500	0.30	1000	0.20							-2	
330	0.01	250	0.10	2000	0.20								

Height of anemometer: 5.7 m a.g.l. Period: 72060609-82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.3	652	7	23	93	52	66	44	19	22	15	4	0	3	0	2.0	0.86
30	4.2	685	2	50	108	43	31	25	25	5	24	0	1	1	0	1.6	0.79
60	5.3	560	4	49	102	81	60	59	15	16	33	3	2	9	6	3.0	0.99
90	5.3	494	3	44	90	92	68	62	41	22	60	7	3	5	6	3.8	1.13
120	9.0	301	9	46	113	144	124	96	49	50	56	4	4	5	0	5.2	1.77
150	12.7	229	4	67	132	138	140	97	70	42	67	9	2	3	0	5.5	1.90
180	10.9	263	6	47	120	110	119	122	66	60	72	6	3	4	2	5.6	1.84
210	3.9	745	2	15	65	49	45	17	22	13	22	2	3	1	0	1.1	0.67
240	5.1	494	1	22	102	88	58	47	32	26	89	21	3	8	8	4.1	1.12
270	15.0	203	3	34	73	88	109	101	79	60	160	38	10	27	13	7.3	1.65
300	14.7	196	1	46	94	102	130	112	88	76	112	17	8	11	8	6.7	1.79
330	9.6	256	3	56	125	107	129	98	71	47	81	16	5	4	2	5.7	1.74
Total	100.0	336	4	45	103	101	105	88	59	46	82	14	5	9	5	5.3	1.47

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	1.9	3.0	2.8	2.7	2.3	2.2	2.3	2.4	2.1	2.4	2.1	3.9	2.4
9	2.9	4.1	4.5	4.5	4.3	3.9	3.9	3.8	3.2	4.1	2.7	3.4	3.8
12	5.3	6.6	6.2	5.8	5.4	4.5	4.7	4.4	4.5	5.5	5.1	5.5	5.3
15	5.9	7.1	6.9	6.1	6.0	5.7	5.6	4.9	5.0	6.0	5.0	6.2	5.8
18	4.1	5.1	5.8	5.8	6.2	6.1	6.4	6.2	5.1	4.4	3.2	5.6	5.6
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	4.4	5.6	5.5	5.0	4.8	4.5	4.6	4.4	4.0	4.7	3.9	4.9	4.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.1	3.1	4.3	5.7	7.8	8.4	8.5	6.3	5.3	10.6	11.1	10.2	8.3
	1.50	0.94	1.04	1.19	1.88	2.24	2.19	1.55	1.11	1.69	1.87	1.94	1.55
25	7.8	3.4	4.8	6.2	8.5	9.1	9.3	6.9	5.8	11.6	12.1	11.1	9.0
	1.52	0.96	1.05	1.20	1.93	2.30	2.25	1.60	1.12	1.71	1.88	1.97	1.57
50	8.4	3.7	5.1	6.7	9.1	9.8	9.9	7.4	6.2	12.3	12.8	11.8	9.7
	1.56	0.99	1.08	1.23	1.98	2.37	2.31	1.64	1.14	1.73	1.91	2.01	1.60
100	8.9	3.9	5.5	7.1	9.8	10.6	10.7	8.0	6.6	13.1	13.6	12.6	10.4
	1.54	0.96	1.06	1.21	1.94	2.30	2.25	1.60	1.13	1.73	1.91	1.99	1.60
200	9.6	4.2	5.8	7.6	10.7	11.6	11.8	8.7	7.1	14.0	14.6	13.6	11.2
	1.49	0.93	1.03	1.19	1.85	2.19	2.15	1.52	1.11	1.70	1.88	1.94	1.57
Freq	6.0	4.2	4.9	5.3	7.8	11.5	11.5	6.1	4.8	11.9	14.7	11.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	1.9	3.3	4.2	5.6	5.8	6.0	2.4	4.2	7.9	8.0	6.9	5.8
	1.04	0.80	0.98	1.11	1.74	1.92	1.87	0.90	1.09	1.64	1.77	1.75	1.40
25	4.1	2.3	3.9	4.9	6.6	7.0	7.1	2.9	5.0	9.2	9.3	8.1	6.8
	1.08	0.85	1.01	1.15	1.85	2.05	1.99	0.94	1.12	1.67	1.81	1.81	1.45
50	4.8	2.7	4.5	5.7	7.6	8.0	8.1	3.5	5.7	10.3	10.4	9.2	7.8
	1.15	0.92	1.07	1.21	2.05	2.28	2.18	1.02	1.17	1.72	1.87	1.90	1.52
100	5.6	3.3	5.2	6.5	9.0	9.4	9.5	4.1	6.5	11.5	11.7	10.4	8.9
	1.24	0.98	1.14	1.29	2.19	2.44	2.34	1.08	1.25	1.81	1.99	2.04	1.63
200	6.5	3.9	6.0	7.5	10.9	11.6	11.6	4.9	7.4	12.9	13.2	12.0	10.5
	1.20	0.94	1.11	1.25	2.10	2.33	2.25	1.04	1.22	1.79	1.95	1.98	1.62
Freq	4.8	4.2	5.2	5.3	8.7	12.4	11.1	4.5	5.0	14.1	14.6	10.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	1.6	2.9	3.8	4.9	5.1	5.2	1.1	3.8	6.9	6.9	5.9	5.0
	0.89	0.80	0.99	1.14	1.78	1.93	1.87	0.68	1.13	1.66	1.79	1.75	1.40
25	2.8	2.0	3.6	4.6	6.0	6.3	6.4	1.4	4.7	8.3	8.4	7.2	6.1
	0.92	0.84	1.02	1.17	1.89	2.06	1.97	0.70	1.16	1.69	1.82	1.81	1.44
50	3.3	2.4	4.2	5.3	7.0	7.3	7.4	1.7	5.4	9.5	9.6	8.3	7.1
	0.98	0.90	1.07	1.23	2.07	2.26	2.13	0.74	1.21	1.73	1.88	1.90	1.50
100	3.9	3.0	4.9	6.2	8.3	8.7	8.7	2.1	6.3	10.8	10.9	9.5	8.2
	1.06	0.98	1.16	1.33	2.28	2.48	2.34	0.80	1.30	1.81	1.99	2.06	1.60
200	4.6	3.6	5.7	7.2	10.1	10.6	10.6	2.4	7.3	12.2	12.4	11.1	9.6
	1.02	0.95	1.13	1.29	2.19	2.38	2.26	0.77	1.27	1.82	1.98	2.01	1.61
Freq	4.4	4.2	5.3	5.3	9.0	12.7	10.9	3.9	5.1	15.0	14.6	9.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	1.4	2.4	3.1	3.9	4.0	4.0	1.2	3.7	5.4	5.4	4.5	3.9
	0.87	0.82	1.01	1.23	1.83	1.94	1.82	0.76	1.26	1.69	1.81	1.72	1.41
25	2.2	1.8	3.1	4.1	5.1	5.3	5.3	1.6	4.8	7.0	7.0	5.9	5.2
	0.90	0.85	1.04	1.26	1.93	2.04	1.91	0.77	1.28	1.72	1.84	1.77	1.45
50	2.6	2.3	3.7	4.9	6.1	6.3	6.3	2.0	5.6	8.3	8.3	7.0	6.2
	0.94	0.90	1.08	1.31	2.08	2.20	2.04	0.81	1.32	1.76	1.89	1.84	1.51
100	3.2	2.8	4.5	5.8	7.3	7.6	7.5	2.4	6.6	9.6	9.6	8.2	7.3
	1.02	0.99	1.15	1.42	2.37	2.50	2.30	0.87	1.39	1.83	1.98	1.98	1.60
200	3.8	3.3	5.3	6.9	8.9	9.2	9.1	2.8	7.7	11.1	11.1	9.7	8.6
	1.01	0.98	1.16	1.42	2.28	2.41	2.24	0.87	1.41	1.87	2.02	1.99	1.63
Freq	4.3	4.3	5.3	5.8	9.5	12.5	10.1	4.0	6.2	14.8	14.2	9.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.5	656	5.3	270	4.6	177	3.6	84
25	8.1	835	6.2	418	5.6	304	4.7	178
50	8.7	987	7.0	560	6.4	432	5.6	283
100	9.3	1221	8.0	761	7.4	604	6.5	424
200	10.0	1575	9.4	1227	8.6	968	7.7	677

Alicante

38° 16′ 56″ N 00° 32′ 29″ E	UTM 31 E 284945 m N 4240059 m	30 m a.s.l.

Location 5 km S of the city of Alicante. The terrain is smooth. The Mediterranean Sea is 2 km to the E. Some hills with heights up to 400 m are found more than 6 km away in the NW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	2000	0.10	7000	0.40								
30	0.03	7000	0.40										
60	0.10	2000	0.00										
90	0.30	2000	0.00										
120	0.10	1000	0.30	2000	0.00								
150	0.10	2000	0.20	5000	0.00								
180	0.03	1000	0.30	10000	0.00								
210	0.03	1000	0.10										
240	0.03	2000	0.10	8000	0.30								
270	0.03	4000	0.10	10000	0.30								
300	0.03	3000	0.30										
330	0.03	2000	0.10	8000	0.30								

Height of anemometer: 6.0 m a.g.l. Period: 72060603–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.8	474	87	134	99	74	38	26	21	10	26	7	2	3	1	2.5	0.98
30	6.7	398	52	121	133	94	65	48	28	18	30	8	4	0	1	3.4	1.23
60	8.3	303	36	92	77	106	87	87	69	39	73	19	6	4	2	5.1	1.50
90	12.9	224	36	81	107	120	135	103	70	36	72	11	5	1	0	5.4	1.86
120	8.5	303	34	80	104	128	133	86	58	29	37	4	0	1	0	4.6	1.77
150	5.5	480	37	73	84	88	85	70	39	20	23	2	0	0	0	3.2	1.22
180	6.5	414	41	89	88	106	84	66	38	28	42	4	1	0	0	3.7	1.32
210	6.8	422	53	113	107	87	64	61	31	23	32	4	1	0	0	3.3	1.22
240	7.2	378	67	151	108	89	76	47	24	23	26	5	2	3	0	3.3	1.19
270	10.5	297	79	128	116	97	84	61	38	26	43	12	7	8	1	4.1	1.25
300	11.4	247	59	108	99	96	72	70	53	46	96	29	14	8	4	5.2	1.37
330	9.8	286	48	103	84	77	74	60	38	43	113	30	20	16	7	5.3	1.29
Total	100.0	331	52	105	101	98	87	68	45	30	57	13	6	4	2	4.3	1.32

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.0	3.1	2.3	1.9	1.4	1.0	0.9	1.2	1.2	2.3	2.8	3.2	2.0
3	3.3	3.4	3.0	2.4	1.5	1.6	1.2	1.4	1.7	2.6	3.1	3.6	2.4
6	3.6	3.4	3.4	2.5	1.6	1.8	1.4	1.7	1.7	2.7	3.2	3.7	2.5
9	3.7	3.9	4.3	4.6	3.9	3.7	3.6	3.2	3.0	3.3	3.7	3.6	3.7
12	5.3	5.3	6.1	6.5	6.0	5.8	6.0	5.8	5.3	5.2	4.7	4.9	5.6
15	5.7	6.3	6.9	7.0	6.8	6.2	6.3	6.2	6.1	6.1	5.3	5.0	6.1
18	2.9	3.6	4.4	4.7	4.4	4.4	4.4	4.4	3.4	3.0	2.6	2.6	3.7
21	2.8	2.7	2.0	1.8	1.3	1.4	1.4	1.8	1.2	1.9	2.5	2.8	2.0
Day	3.8	4.0	4.1	3.9	3.4	3.3	3.2	3.2	2.9	3.4	3.5	3.7	3.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.5	7.1	9.4	7.9	5.8	5.6	5.8	5.7	6.6	8.1	8.6	7.0
	1.08	1.36	1.41	1.79	1.73	1.38	1.30	1.49	1.42	1.40	1.43	1.38	1.38
25	5.9	6.0	7.8	10.3	8.6	6.4	6.1	6.4	6.2	7.2	8.9	9.4	7.7
	1.09	1.39	1.44	1.81	1.76	1.43	1.33	1.52	1.46	1.42	1.45	1.38	1.40
50	6.3	6.5	8.3	11.0	9.2	6.9	6.6	6.9	6.7	7.7	9.5	10.0	8.3
	1.11	1.43	1.48	1.85	1.81	1.46	1.37	1.57	1.49	1.46	1.47	1.40	1.43
100	6.7	6.9	8.9	11.7	9.9	7.4	7.1	7.4	7.2	8.2	10.1	10.6	8.8
	1.11	1.40	1.45	1.83	1.77	1.42	1.33	1.52	1.46	1.44	1.47	1.40	1.42
200	7.1	7.6	9.6	12.6	10.8	8.1	7.8	8.1	7.8	8.8	10.8	11.3	9.5
	1.08	1.34	1.40	1.78	1.70	1.35	1.27	1.45	1.39	1.39	1.44	1.38	1.39
Freq	6.7	6.5	8.0	11.7	9.6	6.2	6.3	6.7	7.1	9.7	11.3	10.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.9	5.3	6.9	4.8	3.4	3.8	3.8	3.9	4.7	6.1	6.2	4.9
	0.99	1.24	1.32	1.67	1.47	1.04	1.12	1.24	1.22	1.26	1.37	1.27	1.25
25	3.6	4.8	6.3	8.1	5.8	4.2	4.6	4.7	4.7	5.6	7.2	7.2	5.8
	1.03	1.31	1.38	1.73	1.59	1.12	1.19	1.33	1.30	1.31	1.40	1.29	1.30
50	4.2	5.5	7.2	9.1	6.8	4.9	5.4	5.5	5.5	6.4	8.1	8.1	6.7
	1.12	1.45	1.47	1.83	1.78	1.23	1.32	1.48	1.43	1.40	1.46	1.33	1.38
100	4.9	6.6	8.3	10.4	8.1	5.9	6.5	6.5	6.5	7.3	9.1	9.1	7.8
	1.19	1.54	1.58	1.96	1.90	1.31	1.40	1.58	1.53	1.50	1.55	1.40	1.48
200	5.9	8.0	9.7	12.0	10.1	7.2	7.9	8.0	7.8	8.6	10.4	10.2	9.2
	1.15	1.48	1.52	1.90	1.81	1.26	1.35	1.51	1.47	1.45	1.52	1.38	1.46
Freq	5.8	6.7	8.3	12.8	8.6	5.5	6.5	6.8	7.2	10.5	11.4	9.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	3.6	4.8	5.9	4.2	3.0	3.3	3.3	3.4	4.2	5.3	5.2	4.3
	1.01	1.26	1.37	1.65	1.46	1.05	1.11	1.24	1.21	1.27	1.36	1.25	1.25
25	3.3	4.4	5.8	7.1	5.2	3.8	4.1	4.2	4.2	5.1	6.5	6.3	5.2
	1.06	1.32	1.42	1.71	1.56	1.11	1.17	1.32	1.27	1.31	1.39	1.27	1.29
50	4.0	5.2	6.8	8.2	6.1	4.5	4.9	4.9	5.0	5.9	7.4	7.2	6.1
	1.13	1.43	1.50	1.78	1.73	1.21	1.28	1.44	1.37	1.38	1.44	1.30	1.37
100	4.7	6.2	7.9	9.4	7.3	5.4	5.9	5.9	5.9	6.9	8.5	8.2	7.1
	1.24	1.57	1.63	1.94	1.90	1.33	1.40	1.58	1.50	1.50	1.52	1.36	1.47
200	5.6	7.5	9.3	11.0	9.1	6.6	7.1	7.2	7.1	8.1	9.7	9.3	8.4
	1.20	1.51	1.59	1.89	1.81	1.27	1.35	1.52	1.45	1.46	1.51	1.37	1.47
Freq	5.9	6.8	8.5	12.7	8.2	5.6	6.5	6.8	7.5	10.5	11.3	9.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.9	3.9	4.5	3.2	2.4	2.5	2.7	2.8	3.4	4.2	3.9	3.4
	1.05	1.27	1.42	1.63	1.42	1.06	1.10	1.25	1.24	1.27	1.36	1.22	1.25
25	2.9	3.9	5.1	5.8	4.3	3.2	3.4	3.5	3.7	4.4	5.4	5.1	4.4
	1.10	1.33	1.46	1.67	1.50	1.11	1.16	1.31	1.29	1.31	1.38	1.24	1.29
50	3.6	4.7	6.1	7.0	5.2	3.9	4.1	4.3	4.5	5.3	6.4	6.0	5.3
	1.16	1.41	1.52	1.74	1.63	1.19	1.24	1.42	1.38	1.37	1.42	1.26	1.35
100	4.4	5.7	7.2	8.2	6.3	4.8	5.1	5.3	5.4	6.3	7.5	7.0	6.3
	1.29	1.56	1.64	1.87	1.85	1.35	1.40	1.60	1.53	1.46	1.49	1.31	1.46
200	5.2	6.8	8.5	9.6	7.7	5.8	6.1	6.3	6.5	7.4	8.7	8.1	7.5
	1.26	1.54	1.65	1.88	1.79	1.30	1.36	1.55	1.50	1.47	1.52	1.34	1.47
Freq	6.0	7.0	9.1	12.2	7.9	5.8	6.6	6.9	7.9	10.6	11.1	9.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.4	505	4.6	216	4.0	141	3.1	68
25	7.0	640	5.4	330	4.8	240	4.1	142
50	7.5	753	6.1	434	5.6	335	4.8	224
100	8.0	940	7.0	590	6.5	462	5.7	326
200	8.7	1240	8.3	991	7.6	767	6.8	531

Almería

36° 51′ 00″ N	02° 23′ 00″ W	UTM 30 E 554978 m	N 4078476 m	20 m a.s.l.

Location 5 km E of the city of Almería. The mountains Sierra de Gádor (2200 m) and Sierra de la Alhamilla (1300 m) are more than 30 km away to the NW and NE, respectively.
The distance from the anemometer to the sea is approx. 400 m and the nearest buildings appear to the E at distances of more than 1 km. Close to the anemometer (~ 250 m) there are trees in the NW and N sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.30									-2	
30	0.01	500	0.30										
60	0.01	250	0.30										
90	0.01	125	0.30										
120	0.30	2000	0.00										
150	0.30	700	0.00										
180	0.30	500	0.00										
210	0.30	600	0.00										
240	0.10	1000	0.03										
270	0.01	750	0.13	2000	0.30								
300	0.01	400	0.30									-1	
330	0.01	300	0.30									-2	

Height of anemometer: 6.7 m a.g.l. Period: 72060612–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	17.3	188	163	152	115	130	108	63	31	12	26	6	2	2	0	4.0	1.50
30	5.9	491	261	109	52	26	20	16	13	8	3	2	0	1	0	1.5	0.88
60	6.2	375	128	118	66	58	48	58	51	28	49	13	5	2	2	3.2	1.02
90	14.2	177	79	83	60	85	94	108	87	70	124	28	5	1	0	6.2	1.97
120	4.4	428	54	53	51	82	76	82	62	48	56	7	1	0	1	4.0	1.31
150	3.7	595	93	83	39	48	66	44	16	8	8	1	0	0	0	1.7	0.86
180	6.5	365	181	150	95	97	64	27	11	7	3	0	0	0	0	2.5	1.26
210	6.9	352	117	134	138	121	83	32	9	5	7	0	0	1	0	3.0	1.45
240	17.8	135	82	110	123	142	120	87	70	37	64	22	4	2	0	5.3	1.77
270	10.0	231	94	78	76	81	84	74	61	45	101	41	20	9	3	5.7	1.46
300	2.7	717	50	71	47	41	34	16	7	7	9	0	0	0	0	0.9	0.69
330	4.4	520	119	85	45	52	51	33	26	14	37	10	2	6	1	2.1	0.82
Total	100.0	288	119	109	88	96	85	65	46	29	52	15	4	2	1	4.1	1.31

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.6	2.5	2.5	2.4	2.2	1.8	1.6	1.4	1.4	2.4	2.2	3.0	2.2
3	2.7	2.6	2.3	2.2	1.7	1.5	1.2	1.1	1.5	2.1	2.9	3.7	2.2
6	3.5	3.0	3.0	2.7	2.0	1.5	1.6	1.5	1.9	3.0	3.6	3.7	2.6
9	3.5	3.4	3.0	3.6	3.3	3.9	3.6	3.3	2.7	2.9	3.6	3.8	3.4
12	3.9	4.9	5.6	6.1	5.8	6.0	5.7	5.5	5.5	5.2	4.2	4.1	5.2
15	4.6	5.9	6.2	6.5	6.5	6.2	5.9	5.7	6.0	5.6	4.9	5.2	5.7
18	3.0	4.4	4.7	5.1	5.2	5.2	4.8	4.6	4.7	3.9	3.1	3.7	4.4
21	2.0	2.8	2.7	3.1	2.9	2.9	2.5	2.5	2.3	2.2	2.0	2.5	2.5
Day	3.3	3.8	3.9	4.1	3.9	3.9	3.6	3.4	3.5	3.6	3.4	3.8	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.9	4.6	4.6	11.4	9.3	3.6	3.8	4.5	8.8	9.0	5.4	3.5	7.1
	1.69	1.29	0.99	1.96	1.54	0.92	1.19	1.39	1.95	1.69	1.11	0.85	1.37
25	7.5	5.1	5.0	12.4	10.1	4.0	4.1	5.0	9.6	9.8	5.9	3.8	7.7
	1.74	1.33	1.00	1.98	1.56	0.93	1.23	1.44	1.98	1.71	1.12	0.86	1.38
50	8.1	5.5	5.4	13.2	10.8	4.3	4.5	5.4	10.2	10.4	6.4	4.1	8.3
	1.78	1.37	1.02	2.01	1.58	0.95	1.26	1.47	2.04	1.75	1.15	0.87	1.40
100	8.7	5.9	5.7	14.1	11.4	4.6	4.8	5.8	10.9	11.1	6.8	4.4	8.9
	1.74	1.33	1.01	2.00	1.58	0.94	1.23	1.42	2.00	1.74	1.13	0.87	1.40
200	9.5	6.5	6.1	15.0	12.2	4.9	5.3	6.4	11.9	12.0	7.2	4.6	9.6
	1.66	1.26	0.99	1.97	1.55	0.91	1.16	1.35	1.93	1.69	1.11	0.86	1.38
Freq	13.8	8.9	6.2	12.1	7.0	3.8	5.7	6.8	15.0	12.1	4.6	3.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	1.9	3.9	8.6	5.2	1.7	2.6	3.2	6.4	6.4	1.5	2.6	4.9
	1.50	0.90	1.01	1.95	1.21	0.75	1.07	1.22	1.77	1.46	0.73	0.82	1.25
25	5.7	2.4	4.6	10.0	6.2	2.2	3.2	3.9	7.6	7.5	1.8	3.1	5.9
	1.61	0.96	1.04	1.99	1.25	0.80	1.15	1.31	1.86	1.50	0.76	0.84	1.29
50	6.7	2.9	5.2	11.2	7.0	2.7	3.8	4.6	8.6	8.4	2.2	3.6	6.7
	1.79	1.06	1.08	2.06	1.31	0.88	1.29	1.47	1.99	1.56	0.82	0.87	1.36
100	7.9	3.5	6.0	12.5	8.0	3.3	4.6	5.5	9.8	9.5	2.6	4.1	7.8
	1.91	1.13	1.15	2.19	1.40	0.93	1.37	1.56	2.14	1.67	0.87	0.92	1.45
200	9.7	4.3	6.8	14.2	9.2	4.0	5.6	6.8	11.6	10.9	3.1	4.6	9.1
	1.83	1.08	1.12	2.15	1.36	0.89	1.31	1.49	2.06	1.63	0.85	0.90	1.44
Freq	17.0	6.2	6.2	13.9	4.8	3.7	6.4	6.9	17.5	10.3	2.8	4.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	1.6	3.9	7.5	4.1	1.5	2.3	3.1	5.6	5.5	1.2	2.7	4.3
	1.49	0.85	1.09	1.96	1.13	0.77	1.09	1.20	1.76	1.45	0.72	0.92	1.25
25	5.1	2.0	4.7	9.0	5.0	2.0	2.9	3.9	6.8	6.7	1.5	3.3	5.3
	1.59	0.90	1.12	2.00	1.17	0.82	1.16	1.28	1.83	1.48	0.76	0.95	1.29
50	6.0	2.5	5.4	10.3	5.8	2.5	3.5	4.6	7.8	7.7	1.8	3.9	6.1
	1.74	0.99	1.15	2.06	1.21	0.89	1.27	1.41	1.94	1.54	0.81	0.98	1.35
100	7.2	3.0	6.3	11.6	6.8	3.1	4.2	5.6	9.1	8.8	2.3	4.6	7.2
	1.92	1.08	1.23	2.17	1.31	0.97	1.39	1.55	2.12	1.63	0.88	1.05	1.44
200	8.8	3.7	7.2	13.3	7.8	3.7	5.2	6.8	10.7	10.1	2.7	5.2	8.4
	1.84	1.03	1.21	2.17	1.28	0.93	1.34	1.48	2.05	1.62	0.85	1.03	1.45
Freq	16.6	5.9	6.5	13.8	4.4	3.9	6.5	7.6	17.4	9.5	2.8	5.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	1.5	3.7	5.8	3.0	1.4	1.9	2.8	4.4	4.3	1.1	2.5	3.4
	1.48	0.87	1.23	1.94	1.07	0.83	1.10	1.23	1.74	1.43	0.73	1.09	1.26
25	4.2	2.0	4.8	7.5	3.9	1.9	2.5	3.7	5.7	5.5	1.4	3.4	4.4
	1.56	0.91	1.25	1.97	1.10	0.88	1.17	1.30	1.79	1.46	0.76	1.13	1.29
50	5.1	2.5	5.7	8.8	4.6	2.3	3.1	4.5	6.8	6.6	1.7	4.1	5.3
	1.68	0.98	1.28	2.02	1.13	0.94	1.26	1.41	1.88	1.51	0.79	1.18	1.35
100	6.2	3.1	6.7	10.3	5.5	2.9	3.8	5.6	8.0	7.7	2.2	4.9	6.3
	1.91	1.10	1.35	2.11	1.21	1.06	1.43	1.60	2.04	1.58	0.85	1.27	1.44
200	7.5	3.7	7.7	11.9	6.4	3.5	4.6	6.8	9.5	8.9	2.6	5.8	7.5
	1.85	1.06	1.37	2.16	1.22	1.02	1.38	1.54	2.05	1.61	0.85	1.27	1.46
Freq	15.2	5.8	7.4	12.6	4.3	4.3	6.6	8.8	16.4	8.6	3.0	6.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.5	524	4.6	220	4.0	145	3.1	69
25	7.1	666	5.4	338	4.9	248	4.1	146
50	7.5	789	6.1	450	5.6	349	4.9	230
100	8.1	974	7.0	612	6.5	485	5.8	340
200	8.7	1271	8.3	1004	7.7	791	6.8	550

Avilés

43° 33′ 25″ N	06° 01′ 54″ W	UTM 29	E 739763 m	N 4827035 m	100 m a.s.l.

Location in the airport of Asturias between the foothills of Sistema Cantábrico (> 2000 m a.s.l.) to the S, and the sea to the N. The distance to the generally W-E oriented coastline is 2 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	500	0.20	2750	0.00							10	-9
30	0.03	500	0.20	2500	0.00							-7	-6
60	0.03	900	0.20	4500	0.00							-12	4
90	0.03	400	0.30									2	10
120	0.05	1000	0.30									20	5
150	0.05	1000	0.30									24	-3
180	0.05	1000	0.30									11	-9
210	0.10	1000	0.30									-7	-7
240	0.03	750	0.20									-9	4
270	0.03	1000	0.20	6000	0.03							5	9
300	0.03	1500	0.20	2750	0.00							18	5
330	0.03	750	0.20	2500	0.00							22	-3

Height of anemometer: 6.0 m a.g.l. Period: 72060609-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.9	548	19	103	113	96	64	20	20	1	13	2	0	0	0	2.4	1.14
30	7.0	556	8	111	118	98	71	20	13	3	1	0	0	0	0	2.4	1.23
60	6.9	550	13	82	120	97	73	34	21	6	4	0	0	0	0	2.5	1.19
90	11.7	305	18	126	141	159	139	48	40	7	15	2	1	0	0	4.1	1.83
120	5.9	636	16	129	86	72	39	10	10	1	1	0	0	0	0	1.6	0.97
150	4.7	814	21	62	46	33	13	5	4	0	2	0	0	0	0	0.4	0.58
180	4.5	863	13	46	32	25	12	4	4	0	0	0	0	0	0	0.4	0.61
210	5.9	644	23	127	95	58	24	11	12	0	6	1	0	0	0	1.5	0.90
240	14.5	239	21	197	203	155	100	35	36	3	9	1	0	0	0	3.9	1.94
270	11.6	333	11	122	137	158	111	42	50	7	25	3	1	1	0	4.1	1.65
300	12.9	298	8	81	127	151	141	64	68	12	38	7	1	3	1	4.8	1.75
330	7.4	498	4	84	115	118	88	40	33	4	11	2	2	0	0	3.1	1.29
Total	100.0	452	14	115	125	118	88	34	32	5	13	2	1	1	0	3.2	1.36

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	2.4	2.2	2.4	1.6	1.8	1.3	1.0	1.2	1.5	2.2	2.2	2.5	1.8
9	2.6	2.3	2.7	2.6	2.5	2.6	2.4	1.8	1.8	2.2	1.9	2.5	2.3
12	2.7	3.3	4.2	4.5	4.3	4.2	4.5	4.0	3.7	3.1	2.7	2.3	3.6
15	2.8	3.8	4.7	5.0	4.5	4.2	4.5	4.2	4.0	3.4	2.8	2.4	3.9
18	2.0	2.3	3.2	4.0	3.5	3.6	3.6	3.1	2.6	1.9	1.8	1.7	2.8
21	2.2	1.9	2.0	2.1	1.4	1.7	1.6	1.3	1.0	1.4	1.6	1.7	1.6
Day	2.5	2.7	3.3	3.4	3.2	3.1	3.0	2.7	2.5	2.4	2.2	2.2	2.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.6	4.4	6.5	4.5	1.5	1.3	2.4	7.3	7.2	5.7	4.2	5.1
	1.20	1.21	1.31	1.91	1.42	0.90	0.86	0.88	2.09	2.09	1.67	1.43	1.43
25	3.7	4.0	4.9	7.2	4.9	1.7	1.5	2.6	8.0	7.9	6.3	4.7	5.6
	1.24	1.25	1.35	1.98	1.46	0.93	0.88	0.90	2.16	2.16	1.72	1.48	1.46
50	4.0	4.3	5.3	7.7	5.3	1.9	1.6	2.9	8.6	8.5	6.7	5.0	6.0
	1.26	1.28	1.39	2.03	1.50	0.95	0.90	0.93	2.22	2.21	1.76	1.51	1.49
100	4.3	4.6	5.7	8.3	5.7	2.0	1.7	3.1	9.3	9.2	7.3	5.4	6.5
	1.23	1.24	1.35	1.96	1.46	0.92	0.88	0.90	2.15	2.14	1.71	1.47	1.46
200	4.8	5.0	6.2	9.2	6.3	2.2	1.8	3.3	10.3	10.2	8.0	5.9	7.1
	1.17	1.18	1.28	1.86	1.38	0.88	0.84	0.86	2.03	2.03	1.62	1.39	1.40
Freq	6.3	7.8	9.5	10.4	6.2	3.8	4.0	6.0	14.6	13.6	10.8	6.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.3	3.1	4.8	1.8	0.5	0.6	1.9	5.3	4.9	3.8	2.3	3.4
	0.99	0.99	1.14	1.69	0.99	0.60	0.66	0.83	1.87	1.69	1.44	1.08	1.22
25	2.7	2.9	3.8	5.7	2.2	0.6	0.8	2.3	6.3	5.8	4.5	2.9	4.1
	1.06	1.07	1.23	1.82	1.06	0.63	0.70	0.88	2.01	1.83	1.56	1.16	1.30
50	3.2	3.4	4.5	6.7	2.7	0.8	1.0	2.8	7.3	6.8	5.3	3.4	4.9
	1.18	1.19	1.37	2.04	1.18	0.69	0.76	0.98	2.26	2.05	1.74	1.30	1.42
100	3.9	4.1	5.4	7.9	3.2	1.0	1.3	3.4	8.7	8.1	6.3	4.1	5.8
	1.25	1.26	1.46	2.17	1.26	0.73	0.81	1.04	2.41	2.19	1.86	1.38	1.48
200	4.8	5.1	6.7	9.8	4.0	1.2	1.5	4.1	10.8	10.0	7.8	5.1	7.2
	1.20	1.21	1.39	2.08	1.20	0.70	0.77	0.99	2.30	2.09	1.77	1.32	1.44
Freq	6.5	8.3	9.9	10.5	4.8	3.6	4.2	6.6	17.2	12.5	10.3	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	2.1	2.8	4.1	1.4	0.4	0.4	2.2	4.6	4.2	3.2	2.1	3.0
	0.99	1.02	1.15	1.65	0.92	0.60	0.56	0.97	1.87	1.69	1.44	1.09	1.22
25	2.4	2.7	3.5	5.1	1.7	0.6	0.5	2.7	5.7	5.2	4.0	2.6	3.7
	1.05	1.09	1.23	1.76	0.97	0.63	0.59	1.03	1.99	1.81	1.54	1.16	1.29
50	3.0	3.2	4.2	6.0	2.1	0.7	0.7	3.3	6.7	6.1	4.8	3.1	4.4
	1.16	1.20	1.36	1.95	1.06	0.68	0.63	1.13	2.21	2.00	1.70	1.28	1.40
100	3.6	4.0	5.1	7.1	2.6	0.9	0.9	4.0	7.9	7.3	5.7	3.8	5.3
	1.26	1.31	1.49	2.14	1.16	0.73	0.68	1.23	2.42	2.19	1.86	1.40	1.49
200	4.4	4.8	6.2	8.8	3.1	1.1	1.0	4.9	9.8	9.0	7.0	4.6	6.5
	1.21	1.26	1.42	2.05	1.12	0.70	0.66	1.19	2.32	2.10	1.78	1.34	1.45
Freq	6.6	8.5	9.9	10.2	4.5	3.6	4.3	7.5	17.2	12.2	9.7	5.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.5	1.7	2.3	3.1	1.0	0.7	0.4	2.4	3.6	3.2	2.5	1.6	2.4
	0.96	1.01	1.19	1.59	0.88	0.80	0.60	1.24	1.85	1.67	1.39	1.04	1.24
25	2.0	2.3	3.1	4.1	1.3	0.9	0.6	3.2	4.7	4.3	3.3	2.1	3.1
	1.01	1.07	1.26	1.69	0.93	0.84	0.62	1.31	1.96	1.77	1.48	1.10	1.29
50	2.5	2.8	3.8	5.0	1.7	1.1	0.8	3.9	5.7	5.2	4.0	2.6	3.8
	1.10	1.15	1.37	1.83	1.00	0.90	0.66	1.42	2.12	1.92	1.60	1.19	1.38
100	3.1	3.5	4.7	6.0	2.1	1.4	1.0	4.8	6.9	6.3	4.9	3.2	4.7
	1.24	1.30	1.55	2.08	1.13	1.01	0.73	1.62	2.42	2.18	1.81	1.35	1.53
200	3.7	4.3	5.7	7.3	2.5	1.7	1.2	5.8	8.4	7.6	6.0	3.9	5.7
	1.19	1.26	1.49	2.01	1.09	0.98	0.71	1.56	2.33	2.10	1.75	1.30	1.48
Freq	6.9	8.7	9.9	9.4	4.4	3.7	4.6	8.8	16.6	11.9	9.2	5.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.6	176	3.2	76	2.8	50	2.2	24
25	5.0	222	3.8	117	3.4	86	2.9	51
50	5.4	267	4.4	156	4.0	121	3.5	81
100	5.9	354	5.2	244	4.8	185	4.2	122
200	6.5	510	6.5	494	5.9	364	5.2	233

Badajoz

38° 53′ 00″ N	06° 49′ 45″ W	UTM 29	E 688302 m	N 4306142 m	185 m a.s.l.

Location 14 km E of the city of Badajoz and 3 km W of the city of Talavera la Real, in the valley of Guadiana.
The station is in the airport of Base Aérea de Talavera la Real and the anemometer is situated 1.5 m above the roof of an 11.5 m high building. There are other buildings in the sectors E, S and W.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.25										
30	0.01	1250	0.25										
60	0.01	1250	0.25										
90	0.01	150	0.25										
120	0.01	100	0.30										
150	0.10	2000	0.30										
180	0.10	2000	0.30										
210	0.10	2000	0.30										
240	0.10	2000	0.30										
270	0.05	2000	0.30										
300	0.01	1500	0.30										
330	0.01	2000	0.25										

Height of anemometer: 13.0 m a.g.l. Period: 72061218–82123115

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.7	441	75	101	73	104	88	48	27	18	21	2	1	0	2	3.0	1.13
30	4.2	602	50	79	84	63	68	20	15	6	10	0	0	0	3	1.9	0.86
60	6.9	405	59	120	104	114	91	45	27	13	19	2	2	0	0	3.3	1.32
90	9.7	328	105	134	107	112	100	55	29	15	13	1	1	0	0	3.4	1.41
120	4.4	606	71	109	59	69	35	28	10	6	5	0	0	0	0	1.6	0.91
150	3.5	731	57	53	28	51	33	22	10	7	7	0	0	0	0	0.9	0.66
180	5.9	445	51	92	88	89	108	51	34	19	20	1	0	0	2	3.2	1.23
210	7.3	355	55	107	112	110	97	57	47	31	26	3	0	0	0	3.8	1.46
240	15.2	192	78	134	126	155	129	88	50	21	25	3	1	0	0	4.6	1.92
270	22.2	138	65	136	129	164	149	91	62	34	30	2	0	0	0	5.0	2.16
300	8.6	334	46	92	100	126	123	80	46	23	27	3	0	0	0	4.2	1.64
330	5.4	455	52	80	82	100	89	54	32	26	28	2	0	0	0	3.2	1.24
Total	100.0	332	67	114	104	123	109	65	40	22	22	2	0	0	0	3.8	1.51

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	1.7	2.2	2.1	1.9	2.1	2.0	1.9	1.6	1.1	1.6	1.2	2.0	1.8
9	2.0	2.7	3.2	3.5	3.6	3.3	3.0	2.7	2.1	2.6	1.7	2.2	2.7
12	3.6	4.7	4.7	4.5	4.4	4.0	3.9	3.4	3.3	4.1	3.4	3.9	4.0
15	4.1	4.6	5.1	5.1	5.0	4.6	4.6	4.5	4.0	4.2	3.7	4.1	4.4
18	2.8	3.6	4.4	4.9	5.1	4.8	4.8	4.6	3.6	3.0	2.3	2.6	3.9
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	2.9	3.6	3.9	3.9	4.0	3.7	3.6	3.3	2.8	3.1	2.5	3.0	3.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	3.6	4.3	5.7	4.8	2.3	4.4	6.1	7.3	7.6	6.9	5.2	6.0
	1.37	1.14	1.40	1.61	1.38	0.89	1.23	1.62	2.13	2.45	2.26	1.66	1.68
25	5.1	4.0	4.8	6.3	5.3	2.5	4.9	6.7	8.0	8.3	7.6	5.8	6.5
	1.41	1.18	1.44	1.66	1.42	0.92	1.26	1.67	2.20	2.52	2.33	1.71	1.72
50	5.5	4.3	5.1	6.8	5.8	2.7	5.3	7.2	8.6	8.9	8.2	6.2	7.0
	1.44	1.21	1.48	1.71	1.46	0.94	1.29	1.71	2.26	2.59	2.39	1.75	1.76
100	5.9	4.7	5.5	7.3	6.2	2.9	5.7	7.7	9.3	9.7	8.9	6.7	7.6
	1.40	1.17	1.43	1.65	1.41	0.91	1.26	1.66	2.19	2.51	2.31	1.70	1.72
200	6.5	5.1	6.1	8.1	6.8	3.2	6.2	8.5	10.3	10.8	9.8	7.4	8.4
	1.33	1.11	1.36	1.56	1.34	0.87	1.19	1.57	2.07	2.37	2.19	1.61	1.63
Freq	6.1	5.2	5.8	8.4	6.6	3.9	4.9	6.8	12.0	19.5	14.0	6.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	2.1	3.1	4.1	2.7	1.3	3.4	4.2	5.1	5.3	4.5	3.3	4.1
	1.12	0.90	1.26	1.38	1.02	0.73	1.15	1.40	1.83	2.05	1.75	1.29	1.43
25	3.7	2.5	3.8	4.9	3.3	1.6	4.2	5.1	6.1	6.3	5.4	4.0	4.9
	1.21	0.97	1.36	1.49	1.10	0.78	1.24	1.51	1.98	2.22	1.88	1.38	1.53
50	4.4	3.1	4.4	5.8	3.9	2.0	4.9	6.0	7.1	7.3	6.2	4.7	5.7
	1.35	1.07	1.52	1.67	1.23	0.86	1.38	1.69	2.22	2.49	2.12	1.55	1.69
100	5.3	3.7	5.3	6.9	4.7	2.4	5.9	7.1	8.4	8.7	7.4	5.6	6.8
	1.44	1.14	1.62	1.77	1.30	0.91	1.47	1.80	2.37	2.65	2.26	1.65	1.78
200	6.5	4.6	6.6	8.6	5.8	2.9	7.3	8.9	10.5	10.8	9.2	7.0	8.5
	1.37	1.09	1.54	1.70	1.24	0.87	1.40	1.72	2.26	2.53	2.15	1.58	1.72
Freq	6.5	4.6	6.5	9.1	5.3	3.7	5.5	7.1	13.9	21.2	10.7	5.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	1.7	2.8	3.6	2.1	0.9	3.1	3.7	4.5	4.6	3.7	2.8	3.5
	1.13	0.87	1.29	1.39	0.96	0.68	1.19	1.42	1.87	2.08	1.67	1.25	1.43
25	3.4	2.1	3.5	4.5	2.6	1.2	3.9	4.6	5.6	5.7	4.6	3.5	4.4
	1.21	0.92	1.38	1.48	1.02	0.72	1.26	1.52	2.00	2.22	1.78	1.33	1.52
50	4.0	2.6	4.1	5.3	3.2	1.5	4.6	5.5	6.5	6.7	5.4	4.1	5.2
	1.33	1.01	1.52	1.64	1.12	0.78	1.39	1.68	2.22	2.46	1.97	1.47	1.65
100	4.9	3.2	5.0	6.4	3.9	1.9	5.6	6.6	7.8	7.9	6.5	5.0	6.3
	1.46	1.10	1.67	1.80	1.23	0.85	1.52	1.85	2.44	2.70	2.17	1.61	1.79
200	6.0	3.9	6.1	7.9	4.7	2.3	6.8	8.1	9.6	9.8	8.0	6.1	7.7
	1.39	1.06	1.60	1.72	1.17	0.81	1.46	1.77	2.33	2.59	2.07	1.54	1.73
Freq	6.6	4.4	6.7	9.3	4.8	3.6	5.7	7.2	14.7	21.8	9.5	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	1.4	2.3	2.8	1.3	0.8	2.5	3.0	3.5	3.6	2.8	2.1	2.8
	1.11	0.90	1.31	1.40	0.88	0.71	1.23	1.48	1.90	2.10	1.58	1.23	1.44
25	2.8	1.9	3.0	3.8	1.8	1.1	3.4	4.0	4.7	4.8	3.7	2.8	3.7
	1.17	0.95	1.39	1.49	0.92	0.74	1.30	1.56	2.01	2.22	1.68	1.29	1.51
50	3.4	2.3	3.7	4.6	2.3	1.4	4.2	4.9	5.7	5.8	4.5	3.5	4.5
	1.27	1.02	1.51	1.61	0.99	0.80	1.41	1.69	2.18	2.42	1.82	1.40	1.62
100	4.2	2.9	4.5	5.6	2.9	1.9	5.1	5.9	6.8	6.9	5.4	4.3	5.5
	1.44	1.15	1.71	1.83	1.12	0.89	1.60	1.93	2.49	2.76	2.07	1.59	1.81
200	5.1	3.5	5.5	6.8	3.5	2.3	6.2	7.2	8.3	8.5	6.6	5.2	6.7
	1.39	1.11	1.65	1.77	1.08	0.86	1.54	1.86	2.40	2.65	2.00	1.53	1.76
Freq	6.5	4.4	6.9	9.4	4.4	3.6	6.0	7.8	15.7	21.4	8.4	5.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.3	215	3.7	90	3.2	60	2.5	29
25	5.8	273	4.4	140	4.0	102	3.3	61
50	6.3	330	5.1	190	4.7	147	4.0	97
100	6.8	435	6.1	298	5.6	227	4.9	150
200	7.5	625	7.6	600	6.9	444	5.9	284

Barcelona

41° 17′ 49″ N 02° 04′ 42″ E	UTM 31 E 422831 m N 4572211 m	5 m a.s.l.

Location 6 km S of the city of Barcelona, 1 km from the coast of the Mediterranean Sea. The terrain is rather flat and smooth. There are some hills of up to 200 m height W of the station at a distance of more than 12 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1000	0.10										
30	0.01	1250	0.10										
60	0.01	3500	0.10										
90	0.01	3000	0.10	4500	0.00								
120	0.01	250	0.10	2250	0.00								
150	0.01	250	0.05	1750	0.00								
180	0.01	500	0.05	2000	0.00							-2	
210	0.01	250	0.05	600	0.10	3000	0.00					-17	
240	0.01	500	0.05	6000	0.00							-10	
270	0.01	250	0.05	2000	0.20								
300	0.01	250	0.05	1000	0.20								
330	0.01	500	0.05	1500	0.20								

Height of anemometer: 6.0 m a.g.l. Period: 72060603-85123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	20.1	131	97	226	194	150	104	63	24	8	4	0	0	0	0	3.9	2.00
30	7.5	333	72	143	132	110	86	62	33	15	11	1	1	0	0	3.5	1.48
60	7.3	320	33	95	108	113	111	91	65	27	30	3	2	1	0	4.4	1.64
90	7.0	336	42	104	114	127	106	78	51	14	21	4	2	1	0	4.1	1.58
120	5.3	464	39	115	119	110	75	47	18	7	5	1	0	0	0	2.9	1.33
150	5.6	447	44	131	121	114	70	44	22	5	3	0	0	0	0	2.9	1.38
180	9.1	275	47	147	147	138	120	81	32	8	5	0	0	0	0	3.9	1.87
210	10.2	245	32	94	118	140	137	114	77	27	13	1	0	0	0	4.8	2.12
240	8.4	277	35	95	111	121	123	105	75	33	24	0	0	0	0	4.6	1.89
270	5.1	475	39	83	65	82	77	71	57	28	21	3	1	0	0	3.2	1.19
300	4.5	535	31	77	74	68	73	59	44	20	15	2	1	0	0	2.7	1.08
330	10.0	240	61	181	172	136	94	64	33	11	6	2	0	0	0	3.8	1.78
Total	100.0	293	55	141	136	126	103	75	43	16	12	1	0	0	0	3.9	1.66

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.8	2.0	1.7	1.5	1.1	0.8	0.8	1.0	1.4	1.7	2.5	3.3	1.7
3	3.4	2.8	2.1	1.8	1.3	1.2	1.0	1.3	1.6	2.5	3.2	3.8	2.2
6	3.6	3.2	2.8	2.6	2.0	2.0	2.0	2.2	2.5	3.2	3.5	3.9	2.8
9	4.3	4.1	4.0	3.5	3.3	3.3	3.1	2.9	3.1	4.1	4.2	4.3	3.7
12	3.9	4.0	4.8	5.2	5.1	5.1	5.3	4.9	4.5	3.8	3.5	4.1	4.5
15	3.7	4.8	5.3	5.3	5.1	5.4	5.4	5.1	4.9	4.3	3.4	3.7	4.7
18	2.1	2.6	4.0	4.0	3.8	4.1	4.1	3.6	2.9	2.1	1.9	2.3	3.1
21	2.2	1.8	2.0	1.8	1.7	1.6	1.4	1.4	1.2	1.5	1.8	2.6	1.8
Day	3.3	3.2	3.4	3.2	3.0	3.0	2.9	2.8	2.8	2.9	3.0	3.5	3.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	5.8	6.4	5.3	4.2	3.8	4.9	7.3	7.1	6.3	5.0	6.2	5.9
	2.39	2.02	1.94	1.58	1.38	1.38	1.80	1.95	1.92	1.66	1.32	2.06	1.78
25	6.7	6.3	7.0	5.9	4.6	4.2	5.4	8.0	7.8	6.8	5.5	6.8	6.5
	2.47	2.08	2.00	1.63	1.42	1.42	1.86	2.01	1.98	1.71	1.35	2.12	1.83
50	7.2	6.8	7.6	6.3	5.0	4.5	5.8	8.6	8.3	7.4	5.9	7.3	6.9
	2.53	2.13	2.06	1.67	1.46	1.46	1.91	2.07	2.04	1.76	1.39	2.18	1.87
100	7.8	7.3	8.2	6.8	5.4	4.8	6.3	9.4	9.0	8.0	6.3	7.9	7.5
	2.45	2.07	1.99	1.62	1.42	1.41	1.85	2.00	1.97	1.70	1.35	2.11	1.81
200	8.6	8.1	9.0	7.5	5.9	5.3	6.9	10.3	10.0	8.8	6.9	8.7	8.3
	2.32	1.96	1.88	1.54	1.34	1.34	1.75	1.90	1.87	1.61	1.29	2.00	1.73
Freq	18.1	10.0	7.4	7.1	5.6	5.5	8.4	9.9	8.8	5.7	4.6	8.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	3.8	4.6	3.5	2.6	2.6	3.6	5.4	4.7	3.8	3.4	4.3	4.0
	2.01	1.51	1.67	1.31	1.12	1.20	1.53	1.76	1.56	1.21	1.15	1.82	1.50
25	5.1	4.6	5.5	4.2	3.2	3.2	4.3	6.5	5.7	4.6	4.1	5.2	4.9
	2.17	1.63	1.80	1.41	1.21	1.29	1.65	1.90	1.68	1.29	1.24	1.96	1.61
50	5.9	5.4	6.4	5.0	3.8	3.8	5.0	7.5	6.6	5.3	4.9	6.0	5.7
	2.44	1.83	2.02	1.58	1.35	1.44	1.86	2.13	1.88	1.42	1.39	2.20	1.79
100	7.0	6.4	7.6	5.9	4.5	4.5	6.0	8.9	7.8	6.3	5.8	7.2	6.8
	2.59	1.94	2.15	1.69	1.43	1.53	1.98	2.27	2.01	1.52	1.48	2.35	1.90
200	8.7	7.9	9.4	7.3	5.6	5.6	7.4	11.1	9.7	7.7	7.2	8.9	8.4
	2.47	1.86	2.05	1.61	1.37	1.47	1.89	2.17	1.92	1.46	1.41	2.24	1.83
Freq	19.5	7.5	7.3	6.9	5.3	5.8	9.0	10.2	8.2	5.1	4.8	10.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.4	3.9	3.0	2.3	2.4	3.3	4.7	4.0	3.2	3.1	3.8	3.5
	1.99	1.52	1.66	1.30	1.13	1.25	1.50	1.73	1.51	1.19	1.25	1.84	1.51
25	4.6	4.2	4.9	3.7	2.9	3.0	4.1	5.8	5.0	4.0	3.9	4.7	4.4
	2.13	1.63	1.77	1.39	1.21	1.33	1.60	1.85	1.62	1.26	1.33	1.97	1.60
50	5.4	5.0	5.7	4.4	3.4	3.6	4.8	6.8	5.9	4.8	4.7	5.5	5.2
	2.36	1.79	1.96	1.53	1.33	1.47	1.77	2.05	1.79	1.38	1.47	2.18	1.76
100	6.4	6.0	6.8	5.3	4.1	4.3	5.7	8.1	7.1	5.7	5.6	6.5	6.2
	2.59	1.98	2.16	1.68	1.45	1.61	1.94	2.25	1.96	1.51	1.62	2.39	1.92
200	7.9	7.3	8.4	6.6	5.1	5.3	7.1	10.0	8.7	6.9	6.9	8.0	7.6
	2.48	1.89	2.06	1.61	1.39	1.54	1.86	2.15	1.88	1.45	1.54	2.29	1.84
Freq	18.3	7.5	7.3	6.7	5.4	6.1	9.0	10.0	7.9	5.0	5.3	11.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	2.7	3.0	2.3	1.8	2.0	2.7	3.6	3.1	2.5	2.6	3.0	2.8
	1.99	1.55	1.65	1.28	1.11	1.29	1.48	1.71	1.47	1.20	1.38	1.88	1.51
25	3.8	3.6	4.0	3.1	2.3	2.7	3.6	4.8	4.1	3.4	3.5	3.9	3.7
	2.11	1.64	1.75	1.35	1.17	1.37	1.57	1.81	1.55	1.26	1.46	1.99	1.60
50	4.7	4.4	4.9	3.8	2.9	3.2	4.4	5.8	5.0	4.1	4.3	4.7	4.5
	2.30	1.78	1.90	1.47	1.27	1.48	1.71	1.96	1.69	1.36	1.58	2.16	1.72
100	5.6	5.3	5.9	4.6	3.6	4.0	5.3	6.9	6.1	5.0	5.2	5.7	5.4
	2.62	2.03	2.16	1.67	1.44	1.68	1.94	2.24	1.92	1.53	1.79	2.46	1.94
200	6.8	6.5	7.2	5.6	4.3	4.8	6.5	8.5	7.4	6.1	6.3	6.9	6.6
	2.52	1.95	2.08	1.61	1.39	1.62	1.87	2.15	1.85	1.48	1.73	2.37	1.88
Freq	16.7	7.4	7.3	6.5	5.4	6.6	9.1	9.8	7.6	4.9	6.0	12.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.2	191	3.7	80	3.2	53	2.5	26
25	5.7	243	4.4	125	3.9	92	3.3	55
50	6.2	293	5.1	169	4.6	132	4.0	87
100	6.7	386	6.0	266	5.5	202	4.8	134
200	7.4	553	7.5	533	6.8	397	5.9	253

El Hierro

27° 48′ 46″ N 17° 53′ 07″ W	UTM 28 E 215743 m N 3079847 m	31 m a.s.l.

Location on the E coast of the island of Hierro. The E part of the island forms a steep slope - from sea level to more than 1100 m a.s.l. in approx. 5 km.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	150	0.00									-4	
30	0.01	100	0.00									-3	
60	0.01	100	0.00										
90	0.01	100	0.00										
120	0.01	200	0.00										
150	0.01	500	0.00										
180	0.01	750	0.10	1500	0.00								
210	0.01	250	0.10	3000	0.03								
240	0.01	200	0.10	1250	0.30								
270	0.01	250	0.10	1500	0.30	10000	0.00						
300	0.01	500	0.30	6000	0.00								
330	0.01	750	0.03	4000	0.00								

Height of anemometer: 6.0 m a.g.l. Period: 73080315-82123115

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	17.0	40	6	24	33	81	117	76	104	65	319	80	34	18	2	9.3	2.90
30	54.7	8	3	10	17	68	109	81	108	114	358	85	30	7	0	9.5	4.18
60	6.8	76	6	25	69	115	124	110	143	68	200	42	11	10	0	7.8	2.59
90	2.8	302	17	189	126	156	103	30	28	10	26	7	0	6	0	3.9	1.45
120	0.8	424	31	144	103	124	40	15	46	39	28	5	0	0	0	3.2	1.20
150	1.6	271	10	89	88	166	202	81	34	10	45	2	0	2	0	5.0	2.14
180	9.0	66	26	86	102	158	296	98	52	20	80	11	3	1	0	6.1	2.47
210	2.2	180	14	52	130	106	180	40	117	71	60	24	12	14	2	6.2	1.81
240	1.2	506	10	26	192	37	168	0	29	7	18	3	0	3	0	3.3	1.30
270	0.8	642	5	20	113	81	25	0	27	0	77	0	0	5	5	2.3	0.80
300	0.9	709	0	17	35	64	41	37	14	17	19	5	20	10	14	1.8	0.67
330	2.4	159	0	64	47	112	219	39	104	25	136	31	15	7	40	6.5	1.37
Total	100.0	64	7	30	42	88	133	78	99	83	278	66	24	9	2	8.6	2.81

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	12.9	-	7.2	-	5.1	-	-	-	-	8.4
6	-	-	12.9	5.1	-	5.1	10.3	11.3	-	-	-	6.2	8.5
9	5.7	6.3	7.6	7.1	7.8	7.6	9.7	8.8	6.8	6.4	5.6	5.5	7.1
12	6.3	6.5	7.8	7.4	7.9	7.9	9.6	8.6	6.8	6.5	6.0	6.3	7.3
15	6.4	6.9	7.8	7.2	8.1	8.0	9.7	8.8	7.3	6.6	6.2	6.3	7.4
18	6.4	6.8	7.9	7.3	8.3	8.0	9.7	9.7	8.0	6.4	5.0	5.0	7.5
21	-	-	-	-	-	-	-	-	-	-	-	-	-
Day	6.2	6.6	7.7	7.2	7.9	7.9	9.7	8.8	7.0	6.5	5.9	6.0	7.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.3	10.4	9.0	4.8	3.6	5.7	7.5	9.1	6.9	3.8	2.7	8.4	9.6
	2.92	4.15	2.86	1.51	1.26	2.02	2.35	1.94	1.69	0.85	0.68	1.39	2.74
25	11.2	11.3	9.9	5.3	4.0	6.2	8.2	9.9	7.6	4.1	2.9	9.1	10.4
	2.99	4.26	2.95	1.56	1.30	2.08	2.43	1.98	1.74	0.86	0.69	1.40	2.80
50	12.0	12.1	10.6	5.7	4.3	6.7	8.8	10.6	8.2	4.4	3.1	9.7	11.2
	3.07	4.38	3.03	1.60	1.33	2.14	2.49	2.03	1.78	0.87	0.69	1.43	2.86
100	12.9	13.1	11.5	6.1	4.7	7.2	9.5	11.3	8.8	4.7	3.3	10.4	12.1
	3.00	4.25	2.94	1.55	1.29	2.07	2.41	1.99	1.74	0.87	0.69	1.42	2.81
200	14.1	14.5	12.7	6.7	5.1	8.0	10.6	12.3	9.6	5.0	3.5	11.1	13.3
	2.88	4.05	2.78	1.47	1.23	1.96	2.28	1.93	1.66	0.85	0.69	1.39	2.72
Freq	15.9	51.8	10.4	3.1	1.0	1.5	8.3	2.8	1.3	0.8	0.9	2.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	7.2	5.5	2.8	2.8	4.6	5.2	6.7	4.0	2.2	3.7	6.7	6.7
	2.86	3.47	2.02	1.26	1.15	1.92	1.90	1.76	1.23	0.73	0.92	1.76	2.43
25	8.5	8.6	6.6	3.4	3.4	5.5	6.3	7.9	4.8	2.7	4.4	7.9	7.9
	3.05	3.73	2.18	1.36	1.24	2.07	2.05	1.83	1.31	0.74	0.94	1.83	2.57
50	9.8	9.8	7.6	4.1	4.0	6.4	7.2	9.0	5.6	3.0	5.0	9.0	9.1
	3.36	4.15	2.45	1.52	1.39	2.33	2.31	1.93	1.44	0.76	0.97	1.95	2.80
100	11.4	11.6	9.0	4.8	4.8	7.6	8.6	10.2	6.6	3.5	5.7	10.3	10.7
	3.60	4.43	2.61	1.62	1.48	2.48	2.45	2.07	1.54	0.80	1.02	2.09	2.97
200	13.9	14.3	11.2	6.0	5.9	9.4	10.7	11.9	7.9	3.9	6.4	12.1	13.1
	3.45	4.24	2.49	1.54	1.41	2.37	2.35	2.01	1.48	0.79	1.00	2.03	2.90
Freq	22.4	47.7	6.2	2.5	0.9	2.7	8.0	2.1	1.1	0.8	1.1	4.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.3	6.3	4.7	2.4	2.6	4.1	4.6	5.8	3.4	1.9	3.9	6.0	5.8
	2.91	3.41	1.94	1.23	1.21	1.96	1.89	1.76	1.22	0.71	1.04	1.92	2.42
25	7.7	7.7	5.8	3.1	3.2	5.1	5.7	7.1	4.3	2.3	4.7	7.3	7.1
	3.08	3.63	2.07	1.32	1.29	2.09	2.03	1.82	1.28	0.73	1.06	1.99	2.54
50	8.9	8.9	6.8	3.7	3.8	6.0	6.7	8.1	5.0	2.7	5.4	8.4	8.3
	3.35	3.98	2.30	1.45	1.43	2.31	2.24	1.91	1.39	0.74	1.10	2.12	2.74
100	10.4	10.6	8.1	4.4	4.6	7.2	7.9	9.4	6.0	3.1	6.3	9.7	9.8
	3.68	4.37	2.52	1.59	1.56	2.55	2.46	2.08	1.52	0.77	1.17	2.32	2.97
200	12.7	12.9	9.9	5.4	5.7	8.8	9.8	10.9	7.2	3.5	7.2	11.5	11.9
	3.54	4.19	2.41	1.52	1.50	2.44	2.36	2.03	1.47	0.77	1.16	2.25	2.90
Freq	25.4	43.9	5.9	2.3	1.0	3.3	7.4	2.0	1.1	0.8	1.2	5.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	4.8	3.5	2.0	2.2	3.3	3.6	4.4	2.5	1.4	3.5	4.7	4.5
	3.11	3.46	1.84	1.24	1.32	2.06	1.81	1.71	1.13	0.71	1.20	2.10	2.46
25	6.4	6.3	4.7	2.6	2.9	4.4	4.8	5.7	3.3	1.9	4.6	6.1	5.9
	3.28	3.66	1.95	1.31	1.40	2.19	1.92	1.76	1.18	0.72	1.23	2.19	2.58
50	7.6	7.6	5.6	3.2	3.5	5.3	5.8	6.8	4.1	2.2	5.5	7.3	7.1
	3.53	3.97	2.12	1.42	1.51	2.38	2.09	1.84	1.25	0.73	1.27	2.31	2.75
100	9.1	9.1	6.8	3.9	4.3	6.4	6.9	8.0	4.9	2.7	6.5	8.7	8.5
	4.00	4.51	2.41	1.62	1.72	2.71	2.38	1.99	1.38	0.75	1.34	2.55	3.04
200	11.1	11.1	8.3	4.7	5.3	7.8	8.5	9.4	5.9	3.1	7.6	10.4	10.3
	3.87	4.35	2.33	1.56	1.66	2.61	2.30	1.99	1.36	0.77	1.36	2.52	2.99
Freq	29.6	38.6	5.5	2.0	1.1	4.2	6.6	1.9	1.1	0.9	1.4	7.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.5	559	5.9	203	5.1	134	4.0	62
25	9.3	721	7.0	330	6.3	240	5.3	136
50	10.0	877	8.1	475	7.4	363	6.3	229
100	10.8	1117	9.5	744	8.7	571	7.6	374
200	11.8	1512	11.7	1388	10.6	1043	9.2	674

Fuerteventura

28° 27′ 00″ N	13° 51′ 00″ W	UTM 28	E 612606 m	N 3147636 m	17 m a.s.l.

Located in an airport near the sea, 3 km S of the city of Puerto del Rosario. The sea is to the E and the coastline runs approx. N–S. The mountain Rosa del Taco (593 m) appears at a distance of 8 km to the W.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	2500	0.003	5000	0.30								
30	0.01	1250	0.00										
60	0.01	500	0.00										
90	0.01	500	0.00										
120	0.01	750	0.00										
150	0.01	900	0.00										
180	0.01	1000	0.20										
210	0.01	1000	0.20										
240	0.01	750	0.20										
270	0.01	700	0.20										
300	0.01	750	0.20										
330	0.01	750	0.20										

Height of anemometer: 6.0 m a.g.l. Period: 72060612–82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	20.0	39	19	54	83	143	136	154	140	103	106	20	3	0	0	7.0	2.88
30	24.4	29	11	29	39	73	85	143	166	157	213	47	7	0	0	8.3	3.75
60	21.6	34	7	20	41	87	103	167	170	157	180	28	3	1	0	8.0	3.70
90	5.0	134	28	65	140	156	144	134	95	59	43	1	0	0	0	5.6	2.42
120	2.2	302	52	108	150	134	121	48	68	10	7	0	0	0	0	4.0	1.81
150	2.4	277	18	55	125	120	116	101	76	41	48	12	3	9	0	5.2	1.70
180	2.3	306	19	60	94	107	86	126	88	46	52	12	1	0	2	5.3	1.53
210	1.8	473	17	47	44	65	35	96	88	52	64	6	14	0	0	4.2	1.26
240	1.6	349	33	68	86	90	71	82	77	46	59	31	5	2	2	4.8	1.42
270	2.4	286	41	100	94	73	58	81	79	56	87	36	5	3	0	5.1	1.46
300	6.0	129	38	116	157	145	76	87	65	75	78	20	3	6	5	5.4	1.53
330	10.4	70	37	130	179	197	100	89	79	58	56	3	1	0	0	5.2	1.91
Total	100.0	85	19	55	83	115	103	134	132	112	131	25	4	1	0	7.2	2.76

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4.2	4.8	5.4	4.4	5.6	5.4	6.0	5.5	4.2	3.9	4.1	4.1	4.8
9	4.4	4.6	5.8	5.7	6.8	6.6	7.0	6.9	5.3	4.3	4.1	4.5	5.5
12	5.9	6.4	7.1	7.2	7.6	7.4	8.1	7.8	6.4	6.1	5.8	5.6	6.8
15	6.2	6.7	7.5	7.5	7.9	7.8	8.4	8.2	7.1	6.4	5.8	6.0	7.1
18	5.5	6.4	7.5	7.5	7.9	7.8	8.3	7.9	6.6	6.3	5.4	5.1	6.8
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	5.3	5.8	6.7	6.5	7.2	7.0	7.6	7.2	5.9	5.4	5.1	5.1	6.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.4	10.0	9.4	7.9	5.4	6.0	8.1	7.4	7.8	8.5	9.1	8.8	9.3
	3.23	3.57	3.65	2.81	1.96	1.68	2.06	1.57	1.54	1.62	1.73	2.18	2.64
25	11.3	11.0	10.3	8.7	5.9	6.6	8.9	8.1	8.5	9.3	9.9	9.6	10.2
	3.31	3.67	3.76	2.90	2.02	1.73	2.12	1.60	1.57	1.65	1.75	2.23	2.71
50	12.1	11.8	11.1	9.3	6.3	7.1	9.6	8.7	9.1	9.9	10.6	10.3	10.9
	3.40	3.77	3.87	2.98	2.08	1.77	2.18	1.64	1.61	1.68	1.79	2.30	2.77
100	13.1	12.7	12.0	10.1	6.8	7.7	10.3	9.3	9.7	10.6	11.3	11.1	11.8
	3.32	3.67	3.74	2.88	2.01	1.72	2.12	1.61	1.58	1.67	1.77	2.24	2.72
200	14.3	14.1	13.3	11.2	7.6	8.5	11.3	10.0	10.4	11.4	12.1	12.1	13.0
	3.17	3.48	3.55	2.73	1.90	1.63	2.03	1.56	1.54	1.62	1.73	2.15	2.62
Freq	18.4	23.8	22.1	7.8	2.7	2.4	2.3	1.9	1.6	2.2	5.3	9.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.3	6.9	6.4	4.5	3.3	4.2	5.8	4.8	5.6	5.9	6.3	6.1	6.4
	2.91	3.07	3.07	2.02	1.49	1.43	1.80	1.27	1.42	1.48	1.59	2.01	2.29
25	8.6	8.2	7.6	5.4	3.9	5.1	6.9	5.7	6.6	7.0	7.5	7.3	7.7
	3.11	3.31	3.31	2.18	1.61	1.54	1.91	1.33	1.48	1.52	1.65	2.15	2.43
50	9.9	9.4	8.8	6.2	4.6	6.0	7.9	6.5	7.4	7.9	8.4	8.4	8.8
	3.43	3.72	3.72	2.45	1.81	1.73	2.11	1.41	1.56	1.61	1.74	2.38	2.66
100	11.5	11.1	10.4	7.4	5.4	7.1	9.3	7.5	8.5	9.0	9.6	9.8	10.3
	3.67	3.96	3.96	2.61	1.92	1.85	2.26	1.51	1.68	1.73	1.86	2.55	2.85
200	14.1	13.9	12.9	9.2	6.8	8.8	11.3	8.7	9.9	10.4	11.1	12.0	12.7
	3.52	3.78	3.78	2.49	1.84	1.76	2.17	1.46	1.63	1.67	1.81	2.44	2.77
Freq	20.3	24.3	21.0	4.9	2.2	2.4	2.3	1.8	1.6	2.5	6.1	10.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.3	5.9	5.5	3.9	2.9	3.7	5.0	4.2	4.8	5.2	5.4	5.4	5.6
	2.97	3.03	3.03	2.00	1.45	1.43	1.77	1.29	1.43	1.51	1.58	2.06	2.29
25	7.7	7.3	6.8	4.8	3.6	4.6	6.1	5.2	5.9	6.3	6.6	6.6	6.8
	3.15	3.25	3.25	2.14	1.55	1.52	1.87	1.34	1.48	1.55	1.63	2.18	2.41
50	9.0	8.5	7.9	5.6	4.2	5.5	7.1	6.0	6.8	7.3	7.6	7.7	8.0
	3.45	3.60	3.60	2.37	1.71	1.69	2.03	1.41	1.56	1.63	1.72	2.38	2.61
100	10.6	10.1	9.4	6.7	5.1	6.6	8.4	7.0	7.9	8.4	8.7	9.1	9.4
	3.79	3.95	3.95	2.60	1.88	1.85	2.23	1.54	1.70	1.77	1.87	2.62	2.86
200	12.9	12.5	11.6	8.2	6.2	8.1	10.2	8.2	9.2	9.8	10.1	11.1	11.5
	3.63	3.78	3.78	2.49	1.80	1.77	2.15	1.49	1.65	1.73	1.82	2.51	2.78
Freq	20.6	24.1	19.8	4.7	2.2	2.3	2.3	1.8	1.7	2.7	6.4	11.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	4.6	4.3	3.0	2.3	3.0	3.8	3.4	3.8	4.1	4.2	4.3	4.4
	3.05	3.03	2.98	1.94	1.45	1.41	1.73	1.34	1.44	1.54	1.65	2.19	2.31
25	6.5	6.0	5.6	3.9	3.1	3.9	5.0	4.4	4.9	5.4	5.5	5.7	5.7
	3.22	3.21	3.16	2.06	1.53	1.49	1.81	1.38	1.48	1.59	1.71	2.31	2.42
50	7.8	7.3	6.7	4.7	3.8	4.8	6.1	5.3	5.9	6.4	6.6	6.9	6.9
	3.47	3.49	3.44	2.24	1.66	1.62	1.94	1.45	1.54	1.65	1.79	2.48	2.58
100	9.2	8.7	8.1	5.7	4.6	5.8	7.3	6.3	7.0	7.5	7.7	8.2	8.2
	3.94	3.97	3.91	2.55	1.89	1.84	2.18	1.57	1.66	1.78	1.94	2.82	2.88
200	11.2	10.6	9.9	7.0	5.6	7.1	8.7	7.5	8.2	8.8	9.1	9.9	10.0
	3.80	3.82	3.77	2.45	1.82	1.77	2.12	1.57	1.67	1.79	1.94	2.72	2.83
Freq	21.0	23.9	18.1	4.4	2.2	2.3	2.2	1.7	1.8	3.1	6.9	12.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.3	531	5.7	192	4.9	124	3.9	59
25	9.1	683	6.8	309	6.1	221	5.1	129
50	9.7	829	7.8	442	7.1	333	6.1	214
100	10.5	1057	9.2	689	8.4	521	7.3	346
200	11.5	1432	11.3	1294	10.2	964	8.9	624

Gerona

41° 54′ 05″ N 02° 45′ 40″ E	UTM 31 E 480184 m N 4638937 m	128 m a.s.l.

Location on a great plain which is at 100–150 m a.s.l. To the W there are some 30-m high hills. The anemometer is situated on a 7-m high building, 6 m above the roof. The station is sheltered in the W sector by trees which appear at a distance of 200–300 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30											-10	
30	0.30											-1	
60	0.30												
90	0.01	500	0.30										
120	0.01	500	0.30										
150	0.01	750	0.30										
180	0.01	2000	0.30									-1	
210	0.30											-9	
240	0.30											-7	
270	0.30											-11	
300	0.30											-11	
330	0.30											-12	

Height of anemometer: 13.0 m a.g.l. Period: 72060603-82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	13.6	367	29	85	126	124	99	57	35	22	43	9	3	1	0	4.1	1.45
30	7.0	687	15	59	85	53	38	23	15	11	13	1	0	0	0	1.4	0.78
60	6.2	789	14	52	66	38	24	8	5	1	3	1	0	0	0	0.6	0.61
90	7.3	712	23	60	79	56	40	16	4	4	6	0	0	0	0	1.1	0.75
120	8.3	583	28	81	111	77	52	33	17	10	8	1	0	0	0	2.2	1.03
150	13.8	354	18	84	113	125	112	74	47	29	39	3	2	0	0	4.3	1.60
180	13.5	377	19	82	123	120	99	64	41	29	42	4	0	0	0	4.1	1.51
210	6.0	831	14	38	41	20	19	12	13	5	7	1	0	0	0	0.4	0.52
240	5.5	877	5	32	31	10	10	9	10	7	7	1	0	0	0	0.2	0.44
270	6.3	798	21	76	67	18	7	7	3	3	1	1	0	0	0	0.5	0.60
300	6.0	805	20	62	57	26	12	9	4	1	2	0	2	0	0	0.5	0.56
330	6.6	691	18	87	91	48	29	10	7	7	6	4	0	1	1	1.2	0.76
Total	100.0	589	20	71	92	74	58	35	22	14	20	3	1	0	0	2.3	0.98

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	1.1	0.9	0.9	0.7	0.5	0.3	0.4	0.5	0.5	0.7	0.5	1.3	0.6
3	0.9	0.9	0.7	0.7	0.4	0.3	0.3	0.4	0.4	0.5	0.6	1.0	0.5
6	0.9	0.9	0.7	0.8	0.6	0.4	0.3	0.3	0.5	0.7	0.6	1.2	0.6
9	1.2	1.2	1.7	2.1	2.1	2.0	1.7	1.5	1.3	1.0	0.9	1.1	1.5
12	2.1	3.3	3.8	4.2	4.5	4.2	4.1	4.0	3.1	3.3	2.3	2.2	3.4
15	3.3	4.1	5.3	5.5	5.4	5.2	5.8	5.5	4.7	4.3	3.2	3.2	4.6
18	1.8	2.4	3.4	3.9	4.0	3.7	4.3	3.7	3.1	2.0	1.2	1.7	2.9
21	1.2	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.8	1.0	0.8	1.4	1.0
Day	1.7	2.1	2.5	2.5	2.4	2.2	2.3	2.1	1.8	1.7	1.4	1.7	2.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	6.0	1.8	1.7	2.9	5.8	6.1	4.1	0.6	0.9	1.1	1.9	3.8
	1.37	1.26	0.77	0.81	1.06	1.67	1.81	1.22	0.49	0.59	0.63	0.70	1.02
25	7.8	6.5	2.0	1.9	3.2	6.3	6.7	4.5	0.6	1.0	1.2	2.1	4.2
	1.38	1.27	0.79	0.83	1.10	1.73	1.87	1.26	0.50	0.60	0.65	0.71	1.03
50	8.3	7.0	2.2	2.0	3.4	6.8	7.2	4.9	0.7	1.0	1.3	2.3	4.5
	1.41	1.31	0.81	0.85	1.12	1.77	1.92	1.29	0.50	0.61	0.66	0.73	1.05
100	8.9	7.5	2.4	2.2	3.7	7.3	7.8	5.3	0.7	1.1	1.4	2.4	4.9
	1.40	1.29	0.79	0.83	1.09	1.71	1.86	1.25	0.50	0.60	0.65	0.72	1.04
200	9.5	8.0	2.5	2.3	4.0	8.1	8.6	5.7	0.7	1.2	1.5	2.5	5.3
	1.37	1.25	0.76	0.79	1.04	1.62	1.76	1.19	0.49	0.58	0.63	0.70	1.02
Freq	10.7	9.7	6.5	6.9	7.9	11.6	13.6	8.9	5.7	5.9	6.2	6.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	3.0	1.2	1.2	2.1	4.3	4.1	1.6	0.9	1.1	1.1	1.6	2.7
	1.35	0.95	0.70	0.76	0.97	1.50	1.49	0.75	0.60	0.71	0.69	0.70	0.95
25	6.5	3.6	1.5	1.5	2.6	5.1	4.9	2.0	1.0	1.4	1.4	1.9	3.2
	1.40	0.99	0.75	0.81	1.03	1.62	1.61	0.80	0.62	0.75	0.73	0.72	0.99
50	7.4	4.2	1.8	1.9	3.1	6.0	5.7	2.4	1.3	1.8	1.8	2.2	3.8
	1.47	1.05	0.82	0.90	1.15	1.82	1.81	0.86	0.66	0.83	0.80	0.75	1.06
100	8.4	4.9	2.2	2.3	3.8	7.1	6.8	2.9	1.5	2.2	2.2	2.6	4.6
	1.57	1.12	0.87	0.95	1.22	1.93	1.92	0.91	0.70	0.88	0.85	0.80	1.12
200	9.7	5.7	2.7	2.8	4.7	8.8	8.4	3.4	1.8	2.6	2.6	3.0	5.5
	1.52	1.09	0.83	0.91	1.17	1.85	1.84	0.88	0.68	0.84	0.81	0.77	1.10
Freq	12.3	8.2	6.3	7.2	8.1	13.0	13.6	6.9	5.6	6.1	6.1	6.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	2.1	0.9	1.0	1.9	3.8	3.5	1.1	0.6	1.0	1.0	1.5	2.3
	1.39	0.87	0.68	0.74	0.99	1.54	1.49	0.68	0.58	0.72	0.69	0.72	0.94
25	6.0	2.6	1.2	1.3	2.5	4.7	4.4	1.4	0.8	1.3	1.3	1.8	2.9
	1.44	0.90	0.72	0.78	1.06	1.65	1.59	0.71	0.59	0.76	0.73	0.74	0.98
50	6.9	3.1	1.5	1.6	3.0	5.6	5.2	1.7	1.0	1.6	1.6	2.2	3.5
	1.50	0.95	0.78	0.85	1.16	1.83	1.76	0.75	0.62	0.83	0.79	0.77	1.04
100	8.0	3.8	1.9	2.0	3.6	6.7	6.2	2.1	1.2	2.0	2.0	2.6	4.2
	1.62	1.03	0.85	0.92	1.27	2.01	1.93	0.81	0.66	0.90	0.85	0.82	1.11
200	9.3	4.4	2.3	2.4	4.4	8.2	7.6	2.4	1.4	2.4	2.4	3.0	5.0
	1.58	1.00	0.81	0.88	1.22	1.92	1.85	0.79	0.65	0.86	0.82	0.80	1.10
Freq	12.9	7.7	6.3	7.3	8.2	13.5	13.6	6.2	5.6	6.2	6.0	6.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	1.2	0.5	0.9	1.7	3.0	2.8	0.4	0.2	0.5	0.5	1.4	1.7
	1.42	0.77	0.62	0.77	1.05	1.56	1.49	0.51	0.46	0.60	0.56	0.76	0.91
25	5.1	1.6	0.8	1.2	2.3	4.0	3.7	0.5	0.3	0.7	0.6	1.8	2.3
	1.46	0.80	0.65	0.81	1.11	1.65	1.57	0.52	0.46	0.62	0.58	0.78	0.94
50	6.1	2.0	1.0	1.5	2.8	4.8	4.4	0.6	0.3	0.9	0.8	2.2	2.8
	1.52	0.84	0.69	0.87	1.19	1.79	1.71	0.53	0.47	0.66	0.60	0.81	0.98
100	7.2	2.5	1.3	1.9	3.5	5.9	5.4	0.7	0.4	1.1	1.0	2.7	3.4
	1.62	0.92	0.76	0.98	1.35	2.04	1.94	0.55	0.48	0.73	0.64	0.85	1.04
200	8.4	2.9	1.5	2.3	4.2	7.2	6.6	0.9	0.5	1.4	1.2	3.1	4.1
	1.63	0.90	0.74	0.94	1.30	1.97	1.87	0.56	0.49	0.71	0.64	0.86	1.05
Freq	13.5	7.0	6.4	7.3	8.6	13.9	12.7	6.0	5.5	6.3	6.0	6.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	3.8	192	2.7	87	2.4	58	1.8	28
25	4.1	241	3.3	132	2.9	96	2.4	57
50	4.4	283	3.7	168	3.4	132	2.8	88
100	4.8	364	4.4	235	4.0	183	3.4	128
200	5.2	503	5.3	432	4.8	330	4.1	220

Granada

37° 11′ 00″ N 03° 47′ 00″ W	UTM 30 E 430466 m N 4115565 m	569 m a.s.l.

Location in an airport, 6 km W of the city of Granada. The airport is located on an extended plateau and Sierra Nevada (3300 m) appears 40 km to the E.
The anemometer is situated 4 m above the roof of a 6-m high building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.15	7000	0.30								
30	0.01	750	0.15	7000	0.30								
60	0.01	1500	0.15	7000	0.30							-2	
90	0.01	1500	0.30									-16	
120	0.01	750	0.30									-14	
150	0.01	500	0.15	3000	0.30							-17	
180	0.01	500	0.15	3000	0.30							-17	
210	0.01	750	0.15	3000	0.30							-18	
240	0.01	500	0.15	6000	0.30							-14	
270	0.01	1000	0.15	3000	0.30							-3	
300	0.01	1000	0.20										
330	0.01	750	0.15	7000	0.30								

Height of anemometer: 10.0 m a.g.l. Period: 72060612–82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.9	544	33	113	98	66	51	36	18	20	17	2	0	0	1	2.4	1.05
30	6.7	743	21	53	39	37	25	18	20	18	20	1	2	1	1	1.0	0.63
60	5.4	863	11	36	22	15	16	16	6	3	10	1	0	1	0	0.2	0.45
90	5.6	862	10	44	39	23	6	6	3	3	6	0	0	0	0	0.3	0.51
120	5.4	908	6	27	16	11	5	8	7	1	6	4	0	0	0	0.3	0.51
150	6.7	728	18	39	33	25	22	32	39	21	34	4	3	2	0	1.2	0.66
180	12.3	410	25	89	61	75	66	68	57	64	65	15	3	1	0	4.2	1.30
210	7.3	644	25	82	73	58	41	24	20	18	11	1	0	2	0	1.7	0.84
240	8.7	541	31	103	86	68	50	49	35	16	17	3	0	1	0	2.5	1.04
270	16.8	296	31	118	144	124	101	74	51	34	22	4	1	0	0	4.2	1.66
300	7.8	586	23	68	76	58	40	62	39	30	15	2	0	0	0	2.4	0.97
330	8.2	622	33	95	92	59	41	24	15	13	5	0	0	0	1	1.7	0.92
Total	100.0	582	24	81	76	62	48	42	31	24	22	4	1	1	0	2.3	0.95

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	0.5	0.8	0.5	0.6	0.3	0.1	0.2	0.2	0.2	0.4	0.7	0.7	0.4
9	0.6	0.8	1.2	1.0	0.9	0.8	0.5	0.3	0.7	0.6	0.7	1.0	0.8
12	1.7	2.1	2.8	3.2	3.3	2.8	2.7	2.8	2.2	2.1	1.6	1.7	2.4
15	2.6	3.8	4.6	4.7	5.2	4.9	5.2	4.2	4.3	4.0	2.7	2.5	4.1
18	2.3	3.5	4.5	4.6	5.0	5.1	5.7	4.8	4.3	3.2	2.2	2.2	4.1
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	1.5	2.2	2.7	2.8	3.0	2.8	2.9	2.5	2.3	2.1	1.6	1.6	2.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	2.7	1.0	1.2	1.2	1.4	6.7	5.3	4.2	6.3	5.4	3.1	3.9
	1.15	0.92	0.63	0.71	0.70	0.59	1.22	1.10	1.11	1.78	1.60	1.08	1.02
25	3.9	3.0	1.2	1.3	1.3	1.5	7.3	5.7	4.7	6.9	6.0	3.5	4.3
	1.18	0.94	0.64	0.73	0.71	0.60	1.23	1.12	1.13	1.84	1.65	1.11	1.04
50	4.3	3.3	1.3	1.4	1.4	1.6	7.8	6.2	5.0	7.4	6.4	3.8	4.7
	1.21	0.97	0.65	0.75	0.73	0.60	1.25	1.13	1.16	1.89	1.69	1.13	1.05
100	4.6	3.5	1.3	1.5	1.5	1.8	8.3	6.6	5.4	8.1	7.0	4.0	5.0
	1.17	0.94	0.64	0.73	0.71	0.60	1.24	1.13	1.13	1.83	1.64	1.10	1.04
200	5.0	3.7	1.4	1.6	1.6	1.8	8.8	7.0	5.8	8.9	7.7	4.4	5.4
	1.12	0.90	0.62	0.70	0.68	0.60	1.22	1.10	1.09	1.73	1.55	1.04	1.03
Freq	8.7	7.6	5.9	5.5	5.5	6.2	10.2	9.2	8.2	13.9	11.2	8.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	1.3	0.4	0.7	0.6	1.4	5.2	2.8	3.0	4.5	3.0	1.9	2.6
	0.99	0.69	0.49	0.61	0.57	0.63	1.23	0.91	1.01	1.58	1.13	0.90	0.91
25	3.0	1.6	0.4	0.8	0.8	1.6	6.2	3.4	3.7	5.4	3.7	2.4	3.2
	1.06	0.73	0.51	0.64	0.60	0.63	1.27	0.94	1.07	1.71	1.21	0.96	0.95
50	3.6	1.9	0.6	1.1	1.0	1.8	7.0	3.9	4.3	6.3	4.4	2.9	3.7
	1.18	0.77	0.53	0.70	0.65	0.65	1.32	0.99	1.16	1.92	1.35	1.07	1.01
100	4.4	2.3	0.7	1.3	1.2	2.1	7.9	4.6	5.1	7.4	5.2	3.5	4.4
	1.26	0.82	0.56	0.74	0.68	0.67	1.41	1.06	1.24	2.05	1.44	1.13	1.07
200	5.4	2.7	0.8	1.6	1.5	2.3	9.0	5.3	6.1	9.2	6.5	4.3	5.3
	1.20	0.80	0.55	0.71	0.66	0.67	1.37	1.03	1.19	1.95	1.37	1.09	1.06
Freq	8.8	7.0	5.6	5.5	5.4	6.5	11.5	8.0	8.5	15.9	9.1	8.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	0.9	0.2	0.4	0.3	1.3	4.7	2.1	2.7	3.9	2.3	1.6	2.2
	1.01	0.65	0.47	0.53	0.48	0.65	1.27	0.86	1.02	1.63	1.03	0.88	0.90
25	2.8	1.2	0.3	0.5	0.4	1.6	5.7	2.7	3.3	4.9	2.9	2.0	2.8
	1.08	0.67	0.48	0.56	0.49	0.65	1.30	0.89	1.07	1.74	1.10	0.94	0.93
50	3.4	1.5	0.4	0.7	0.5	1.9	6.6	3.1	4.0	5.8	3.5	2.5	3.3
	1.19	0.70	0.50	0.60	0.51	0.67	1.35	0.94	1.15	1.92	1.21	1.02	0.98
100	4.2	1.8	0.5	0.9	0.6	2.2	7.6	3.8	4.8	6.9	4.3	3.0	4.0
	1.29	0.76	0.53	0.64	0.54	0.69	1.44	1.02	1.26	2.11	1.32	1.12	1.05
200	5.1	2.1	0.6	1.0	0.7	2.5	8.7	4.4	5.7	8.5	5.3	3.7	4.8
	1.24	0.74	0.52	0.62	0.53	0.69	1.42	0.99	1.21	2.02	1.27	1.07	1.04
Freq	8.9	6.8	5.5	5.5	5.4	6.6	12.0	7.6	8.7	16.6	8.3	8.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.7	0.7	0.5	0.5	0.4	1.4	3.7	1.5	2.3	3.1	1.6	1.3	1.8
	0.98	0.63	0.62	0.63	0.55	0.72	1.27	0.85	1.11	1.62	0.96	0.89	0.92
25	2.3	0.9	0.7	0.7	0.5	1.8	4.8	2.0	3.1	4.1	2.2	1.7	2.4
	1.02	0.64	0.65	0.66	0.56	0.73	1.30	0.88	1.16	1.72	1.02	0.94	0.95
50	2.8	1.1	0.9	0.9	0.6	2.1	5.7	2.5	3.8	4.9	2.7	2.2	2.9
	1.11	0.67	0.69	0.70	0.58	0.74	1.34	0.92	1.25	1.87	1.10	1.01	0.99
100	3.5	1.4	1.1	1.2	0.8	2.5	6.7	3.1	4.6	6.0	3.4	2.7	3.6
	1.25	0.72	0.76	0.78	0.62	0.76	1.42	1.00	1.41	2.12	1.24	1.13	1.06
200	4.2	1.7	1.4	1.4	1.0	2.9	7.8	3.7	5.6	7.3	4.1	3.3	4.3
	1.21	0.71	0.74	0.76	0.62	0.78	1.44	0.99	1.36	2.05	1.19	1.10	1.07
Freq	8.8	6.6	5.3	5.6	5.4	7.0	12.1	7.4	9.5	16.2	7.9	8.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	3.9	208	2.7	95	2.3	62	1.9	30
25	4.3	259	3.2	141	2.9	105	2.5	62
50	4.6	307	3.7	183	3.3	142	2.9	95
100	4.9	391	4.3	248	3.9	195	3.5	135
200	5.4	534	5.2	448	4.7	341	4.2	231

La Coruña

43° 08′ 00″ N	08° 23′ 00″ W	UTM 29	E 550157 m	N 4775892 m	97 m a.s.l.

Location 6 km S of the city of La Coruña, on a plateau which is at about 100 m a.s.l. The distance to the Atlantic Ocean is 4 km. The slope towards the sea is uniform.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10	400	0.30	4000	0.00							-7	5
30	0.10	500	0.30										4
60	0.01	250	0.10	500	0.30							3	-1
90	0.01	250	0.10	500	0.30							-2	-4
120	0.01	250	0.30									-10	-4
150	0.01	250	0.30									-13	1
180	0.01	500	0.10	3000	0.30							-8	4
210	0.01	750	0.30									-1	3
240	0.10	750	0.30									3	-1
270	0.10	500	0.30	14000	0.00							-2	-4
300	0.10	300	0.30	9000	0.00							-10	-4
330	0.10	250	0.30	9000	0.00							-14	1

Height of anemometer: 6.0 m a.g.l. Period: 72060612-82123115

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	17.2	100	10	191	153	192	124	107	76	16	28	3	0	0	0	5.0	2.21
30	6.7	313	9	135	90	136	84	93	78	27	34	1	0	0	0	4.4	1.70
60	3.1	574	16	68	47	62	40	88	63	28	15	0	0	0	0	2.6	1.02
90	2.4	741	15	97	46	34	21	15	16	7	9	0	0	0	0	0.9	0.68
120	3.7	513	16	191	109	90	23	15	17	3	17	0	1	5	0	2.6	1.11
150	12.3	153	23	374	202	117	47	30	29	7	11	5	3	0	0	3.5	1.46
180	13.4	112	9	170	104	123	100	101	120	38	89	18	8	6	1	6.0	1.84
210	9.0	202	6	63	76	143	114	118	141	37	65	23	5	6	0	6.1	2.03
240	5.8	300	1	75	127	134	128	75	88	25	37	5	2	3	0	4.9	1.79
270	5.2	346	3	122	111	130	99	87	57	16	24	4	1	0	0	4.2	1.61
300	7.6	236	17	123	87	127	105	123	81	13	29	8	0	1	49	5.5	1.00
330	13.6	145	5	130	129	178	138	121	89	27	32	4	1	0	0	5.3	2.30
Total	100.0	218	11	166	122	140	98	91	80	22	37	7	2	2	4	4.9	1.51

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4.1	4.1	3.5	2.4	2.5	1.7	1.5	1.8	2.0	2.9	3.4	3.5	2.5
9	3.7	3.9	3.5	2.9	3.2	3.1	2.7	2.0	2.2	3.0	3.1	4.1	3.1
12	4.0	4.6	4.8	5.6	5.2	5.0	4.8	4.5	4.3	4.2	3.6	4.1	4.5
15	4.4	5.6	5.9	6.1	5.8	5.7	5.6	5.5	5.3	4.8	4.1	4.6	5.3
18	–	–	7.7	2.1	6.2	4.6	4.6	–	2.6	–	3.1	–	4.6
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	4.0	4.6	4.5	4.2	4.2	3.9	3.7	3.5	3.4	3.8	3.6	4.2	3.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.2	9.0	6.8	3.1	4.4	7.2	9.3	10.1	9.6	8.1	9.1	10.7	8.9
	2.07	2.28	1.51	0.94	1.11	1.53	1.76	2.13	2.12	1.70	1.78	2.18	1.81
25	10.0	9.8	7.4	3.4	4.8	7.9	10.1	11.0	10.4	8.9	9.9	11.7	9.7
	2.12	2.33	1.54	0.96	1.13	1.56	1.79	2.17	2.15	1.73	1.81	2.21	1.84
50	10.7	10.5	8.0	3.7	5.2	8.4	10.8	11.8	11.2	9.5	10.6	12.4	10.3
	2.17	2.40	1.58	0.99	1.16	1.60	1.83	2.22	2.21	1.78	1.85	2.26	1.88
100	11.5	11.3	8.6	3.9	5.5	9.0	11.5	12.6	11.9	10.2	11.4	13.3	11.1
	2.13	2.34	1.55	0.97	1.13	1.57	1.81	2.19	2.17	1.74	1.83	2.24	1.86
200	12.5	12.4	9.3	4.2	5.9	9.7	12.3	13.6	12.9	11.0	12.2	14.3	12.0
	2.05	2.24	1.50	0.93	1.10	1.52	1.76	2.13	2.10	1.68	1.77	2.18	1.81
Freq	16.4	9.4	3.8	2.4	3.3	10.2	13.8	9.9	6.0	4.9	6.9	13.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	6.2	3.8	1.5	3.3	5.2	7.2	7.1	6.7	5.4	6.6	7.7	6.2
	1.81	1.78	1.14	0.75	1.05	1.41	1.77	1.99	1.82	1.45	1.65	2.01	1.62
25	7.2	7.4	4.5	1.9	4.0	6.2	8.4	8.4	7.9	6.5	7.8	9.1	7.4
	1.93	1.87	1.20	0.78	1.11	1.48	1.83	2.07	1.90	1.52	1.71	2.08	1.69
50	8.3	8.4	5.3	2.3	4.7	7.0	9.5	9.5	8.9	7.4	8.8	10.2	8.4
	2.12	2.01	1.29	0.85	1.20	1.58	1.92	2.20	2.03	1.65	1.81	2.19	1.79
100	9.7	9.7	6.2	2.8	5.5	8.1	10.8	10.8	10.2	8.6	10.1	11.6	9.6
	2.27	2.16	1.38	0.90	1.28	1.70	2.06	2.37	2.18	1.77	1.94	2.35	1.92
200	11.7	11.5	7.3	3.3	6.5	9.6	12.4	12.7	11.9	10.2	11.7	13.4	11.3
	2.18	2.08	1.33	0.87	1.23	1.64	2.00	2.30	2.11	1.71	1.88	2.28	1.88
Freq	16.7	6.8	3.0	2.3	3.6	12.5	13.7	8.7	5.2	4.9	7.6	14.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	5.3	2.8	1.3	2.8	4.5	6.5	6.2	5.8	4.7	5.8	6.7	5.4
	1.82	1.68	1.04	0.75	1.04	1.40	1.86	2.03	1.80	1.44	1.68	2.02	1.62
25	6.3	6.5	3.5	1.7	3.5	5.5	7.8	7.5	7.0	5.8	7.1	8.2	6.6
	1.94	1.75	1.08	0.78	1.08	1.46	1.91	2.10	1.87	1.50	1.74	2.08	1.68
50	7.4	7.5	4.2	2.0	4.2	6.4	9.0	8.7	8.1	6.7	8.2	9.4	7.6
	2.12	1.85	1.16	0.84	1.15	1.55	1.99	2.23	1.98	1.61	1.83	2.18	1.77
100	8.8	8.8	5.0	2.5	5.0	7.5	10.3	10.0	9.3	7.8	9.4	10.7	8.9
	2.32	2.03	1.26	0.91	1.26	1.70	2.15	2.44	2.16	1.76	1.99	2.37	1.92
200	10.7	10.3	5.9	3.0	5.9	8.8	11.9	11.7	10.9	9.3	11.0	12.4	10.4
	2.23	1.96	1.23	0.88	1.22	1.64	2.11	2.36	2.09	1.70	1.93	2.31	1.88
Freq	16.8	5.9	2.8	2.3	3.8	13.4	13.7	8.2	5.0	4.9	7.8	15.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.1	2.1	1.1	2.9	3.7	5.1	4.8	4.4	3.8	4.7	5.1	4.3
	1.81	1.63	1.01	0.77	1.28	1.44	1.88	2.02	1.78	1.46	1.76	1.96	1.63
25	5.3	5.4	2.8	1.5	3.8	4.8	6.6	6.3	5.8	5.0	6.1	6.7	5.6
	1.91	1.69	1.04	0.80	1.34	1.48	1.93	2.08	1.84	1.51	1.81	2.01	1.68
50	6.4	6.4	3.4	1.9	4.6	5.8	7.8	7.5	6.9	5.9	7.3	7.9	6.6
	2.05	1.77	1.10	0.84	1.43	1.55	2.00	2.18	1.93	1.60	1.88	2.10	1.76
100	7.6	7.6	4.1	2.4	5.6	6.8	9.2	8.8	8.1	7.1	8.6	9.3	7.8
	2.32	1.92	1.22	0.92	1.60	1.68	2.13	2.36	2.09	1.74	2.02	2.24	1.90
200	9.2	8.9	4.9	2.8	6.7	8.1	10.7	10.4	9.6	8.4	10.1	10.9	9.3
	2.25	1.92	1.20	0.91	1.56	1.68	2.16	2.37	2.09	1.74	2.04	2.26	1.91
Freq	15.2	5.6	2.6	2.5	4.8	13.7	12.9	7.7	5.0	5.2	8.6	16.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	634	5.6	258	4.8	170	3.8	82
25	8.6	809	6.6	402	5.9	292	5.0	173
50	9.2	959	7.4	542	6.8	419	5.9	276
100	9.8	1196	8.5	755	7.9	593	7.0	417
200	10.6	1566	10.0	1261	9.3	988	8.2	684

Lanzarote

28° 56′ 06″ N 13° 36′ 35″ W	UTM 28 E 635510 m N 3201625 m	20 m a.s.l.

Located in an airport on the island of Lanzarote, 5 km WSW of the city of Arrecife. The coastline to the S is oriented WSW-ENE. A chain of hills - the most important being Montaña Blanca (596 m) - runs parallel to the coastline at a distance of 5 km from the station.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.10	8000	0.20								
30	0.01	2500	0.10	9000	0.20								
60	0.01	400	0.00	2000	0.01								
90	0.03	250	0.00										
120	0.03	300	0.00										
150	0.03	400	0.00										
180	0.03	350	0.00										
210	0.03	550	0.00										
240	0.03	250	0.10	2000	0.01	5000	0.00						
270	0.03	500	0.10	5000	0.20								
300	0.03	750	0.10	3500	0.30								
330	0.03	1250	0.10	5000	0.30								

Height of anemometer: 6.0 m a.g.l. Period: 72060609-82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	18.4	56	0	31	83	102	125	133	151	120	150	37	10	2	0	7.7	2.90
30	36.0	28	0	20	58	88	91	107	136	125	247	71	23	6	0	8.7	3.19
60	7.4	137	4	63	153	160	120	95	81	58	93	26	7	3	0	6.0	1.83
90	2.7	344	3	98	282	121	77	16	20	12	18	0	10	0	0	4.0	1.76
120	1.9	443	4	109	269	89	22	25	9	4	18	0	0	2	6	3.4	1.26
150	2.4	437	4	92	226	103	68	27	22	3	7	10	0	1	0	3.4	1.48
180	4.4	189	5	62	124	99	94	51	69	77	117	57	31	22	3	6.6	1.57
210	2.1	388	0	14	122	69	87	42	39	41	71	56	30	36	4	5.4	1.22
240	1.6	457	0	72	188	72	41	58	22	23	36	15	0	16	0	3.8	1.17
270	4.4	235	2	106	264	165	117	21	39	14	11	10	4	6	6	4.5	1.44
300	8.4	103	2	88	260	242	161	65	24	15	20	3	3	13	2	5.0	1.76
330	10.2	85	2	50	168	211	154	148	99	40	33	8	1	2	1	5.7	2.31
Total	100.0	110	1	46	127	126	110	97	102	83	137	40	13	6	1	7.0	2.08

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	5.6	5.5	5.9	5.1	5.7	5.5	7.4	7.2	5.5	4.6	4.9	5.2	5.7
9	5.6	5.4	5.6	5.0	6.7	6.9	8.3	7.8	5.6	4.4	4.9	4.9	5.9
12	5.7	6.6	7.6	7.3	8.1	8.9	9.6	8.3	7.6	6.4	6.1	6.0	7.3
15	5.7	7.2	8.0	7.0	8.3	8.5	9.4	8.8	7.4	6.8	6.2	6.4	7.5
18	5.8	7.1	7.6	6.6	8.2	8.3	9.6	8.9	7.3	6.5	5.3	5.4	7.2
21	-	-	-	-	-	-	-	-	-	-	-	-	-
Day	5.7	6.4	6.9	6.2	7.4	7.6	8.9	8.2	6.7	5.7	5.5	5.6	6.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	12.6	13.2	10.3	5.2	4.1	4.1	7.6	7.1	5.4	7.7	8.8	9.8	10.8
	3.07	3.50	2.38	1.49	1.32	1.44	1.51	1.29	1.13	1.58	1.95	2.55	2.24
25	13.8	14.3	11.2	5.7	4.5	4.5	8.4	7.7	5.9	8.4	9.5	10.7	11.8
	3.11	3.55	2.43	1.54	1.36	1.48	1.54	1.31	1.15	1.60	1.98	2.60	2.27
50	14.6	15.2	11.9	6.1	4.8	4.8	8.9	8.2	6.4	9.0	10.2	11.4	12.6
	3.18	3.62	2.49	1.58	1.39	1.52	1.58	1.34	1.17	1.65	2.04	2.67	2.31
100	15.6	16.3	12.8	6.6	5.2	5.2	9.6	8.8	6.8	9.6	10.9	12.3	13.4
	3.15	3.59	2.45	1.53	1.35	1.47	1.56	1.33	1.15	1.62	2.00	2.62	2.29
200	16.8	17.5	13.9	7.3	5.7	5.7	10.3	9.4	7.3	10.4	11.9	13.4	14.5
	3.07	3.50	2.37	1.45	1.28	1.40	1.51	1.29	1.12	1.57	1.93	2.51	2.26
Freq	17.3	33.7	11.4	3.3	2.0	2.3	4.2	2.4	1.7	4.0	7.8	10.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	9.2	5.4	3.0	2.5	3.0	5.5	4.5	3.7	5.5	6.2	7.1	7.6
	2.92	3.17	1.87	1.31	1.05	1.14	1.41	1.10	1.04	1.50	1.78	2.31	2.07
25	10.6	10.8	6.5	3.6	3.1	3.7	6.5	5.4	4.5	6.5	7.3	8.4	8.9
	3.01	3.27	2.02	1.41	1.13	1.22	1.47	1.13	1.09	1.57	1.87	2.44	2.14
50	11.9	12.1	7.6	4.2	3.7	4.3	7.5	6.1	5.2	7.5	8.3	9.5	10.1
	3.17	3.44	2.27	1.58	1.26	1.37	1.57	1.19	1.17	1.68	2.02	2.64	2.26
100	13.4	13.7	9.0	5.0	4.4	5.2	8.6	7.0	6.1	8.6	9.6	11.0	11.5
	3.40	3.69	2.42	1.69	1.33	1.45	1.69	1.26	1.26	1.80	2.17	2.84	2.40
200	15.5	15.9	11.2	6.2	5.5	6.4	10.1	8.1	7.2	10.1	11.4	13.2	13.4
	3.30	3.59	2.31	1.61	1.27	1.39	1.63	1.23	1.21	1.74	2.09	2.73	2.38
Freq	19.6	34.4	7.1	2.6	1.9	2.5	4.2	2.0	1.8	4.6	8.5	10.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	7.9	4.6	2.5	2.3	2.7	4.8	3.9	3.5	4.8	5.4	6.3	6.5
	2.96	3.16	1.81	1.32	1.10	1.07	1.41	1.10	1.12	1.51	1.81	2.34	2.08
25	9.5	9.6	5.7	3.2	2.9	3.4	5.8	4.8	4.3	5.9	6.6	7.7	8.0
	3.05	3.26	1.94	1.41	1.17	1.14	1.47	1.13	1.17	1.57	1.89	2.45	2.14
50	10.9	11.0	6.7	3.8	3.5	4.1	6.8	5.6	5.1	6.8	7.6	8.9	9.1
	3.19	3.41	2.15	1.56	1.29	1.26	1.56	1.18	1.25	1.67	2.03	2.62	2.24
100	12.4	12.6	8.0	4.6	4.2	5.0	7.9	6.5	6.1	7.9	8.9	10.3	10.6
	3.46	3.71	2.36	1.71	1.41	1.37	1.71	1.27	1.37	1.83	2.22	2.87	2.41
200	14.4	14.6	9.9	5.6	5.1	6.1	9.4	7.5	7.3	9.4	10.6	12.3	12.4
	3.38	3.62	2.26	1.63	1.35	1.32	1.65	1.24	1.32	1.77	2.15	2.78	2.39
Freq	20.8	32.4	6.7	2.6	2.0	2.7	4.1	2.0	2.0	4.9	8.6	11.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	6.2	3.6	2.0	1.7	2.4	3.7	3.0	2.8	3.9	4.3	5.1	5.1
	2.97	3.14	1.80	1.25	1.03	1.11	1.40	1.08	1.13	1.62	1.88	2.38	2.08
25	7.9	8.0	4.7	2.6	2.2	3.2	4.9	3.9	3.7	5.1	5.6	6.7	6.6
	3.06	3.23	1.91	1.32	1.09	1.17	1.46	1.11	1.17	1.68	1.96	2.47	2.15
50	9.4	9.4	5.7	3.2	2.8	4.0	5.9	4.7	4.5	6.1	6.7	7.9	7.9
	3.17	3.36	2.08	1.44	1.17	1.27	1.53	1.15	1.24	1.77	2.08	2.60	2.23
100	11.0	11.0	6.9	3.9	3.4	4.9	7.0	5.5	5.4	7.2	7.9	9.3	9.3
	3.39	3.59	2.37	1.63	1.33	1.44	1.66	1.23	1.37	1.96	2.31	2.83	2.38
200	12.8	12.9	8.4	4.7	4.2	5.9	8.3	6.5	6.4	8.6	9.5	11.1	11.0
	3.43	3.63	2.28	1.57	1.28	1.38	1.66	1.24	1.35	1.94	2.28	2.83	2.41
Freq	22.5	29.7	6.3	2.5	2.0	2.9	3.8	2.0	2.3	5.3	8.8	12.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	9.6	922	6.7	339	5.8	218	4.5	103
25	10.4	1180	7.9	536	7.0	383	5.9	222
50	11.1	1410	8.9	739	8.1	559	7.0	360
100	11.9	1739	10.2	1050	9.4	812	8.2	559
200	12.8	2222	11.9	1697	11.0	1321	9.7	911

Las Palmas

27° 55′ 45″ N	15° 23′ 20″ W	UTM 28	E 461736 m	N 3089460 m	24 m a.s.l.

Located in Gando airport on the E coast of the island of Gran Canaria. The coastline is about 500 m to the E. The island of Gran Canaria is roughly circular with a diameter of about 50 km and a height of 1900 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1500	0.13	3000	0.30								
30	0.01												
60	0.01	750	0.00										
90	0.01	300	0.00										
120	0.01	500	0.00										
150	0.03	750	0.00										
180	0.03	3500	0.12	7000	0.00								
210	0.05	1000	0.15	1500	0.00								
240	0.05	1500	0.30										
270	0.03	900	0.30										
300	0.03	750	0.30										
330	0.03	750	0.20										

Height of anemometer: 4.5 m a.g.l. Period: 73010103-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	38.3	34	4	23	49	76	98	87	133	72	284	97	36	6	0	9.0	2.99
30	37.1	32	1	6	21	41	57	73	134	82	343	136	55	16	2	10.1	4.21
60	3.9	326	12	53	73	106	113	90	89	38	76	15	7	1	0	5.3	1.73
90	2.2	529	16	94	126	82	90	30	18	2	6	0	0	7	0	2.7	1.12
120	1.7	671	16	68	108	62	41	16	4	2	9	0	0	2	0	1.4	0.82
150	2.2	550	11	50	107	97	89	51	30	4	11	0	0	0	0	2.7	1.18
180	2.5	498	4	29	58	70	99	74	70	26	55	9	8	0	0	4.0	1.28
210	2.6	460	3	26	44	79	65	55	83	38	106	24	10	3	2	4.9	1.34
240	1.9	663	14	52	53	35	58	20	37	14	30	12	4	2	6	1.9	0.75
270	1.5	765	31	50	70	27	32	5	8	3	5	2	0	2	0	0.7	0.61
300	1.8	721	22	91	55	52	22	13	4	6	4	2	0	8	0	1.0	0.65
330	4.4	263	19	80	119	122	121	83	72	27	65	21	4	2	1	5.2	1.67
Total	100.0	146	5	26	47	65	79	74	113	63	247	90	35	9	1	8.6	2.66

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.0	5.3	6.2	5.8	7.4	7.6	9.7	9.2	6.9	4.8	4.1	3.3	6.2
3	3.9	4.8	6.0	5.3	7.1	7.5	9.4	9.2	6.8	4.6	3.9	3.4	6.0
6	4.0	4.9	5.9	4.9	6.8	7.0	9.2	8.8	6.5	4.4	3.7	2.9	5.7
9	4.1	4.9	6.6	6.1	8.4	8.7	10.0	9.4	7.6	5.3	4.2	3.4	6.6
12	5.7	7.2	8.4	8.4	9.8	9.7	11.1	10.4	9.1	7.2	6.2	5.3	8.2
15	6.5	7.7	8.6	8.3	9.9	10.1	11.4	10.7	9.2	7.6	6.4	5.5	8.5
18	5.7	7.0	8.4	7.8	9.7	10.0	11.1	10.5	8.9	7.0	5.7	4.8	8.1
21	4.3	5.6	6.7	6.3	8.3	8.7	10.0	9.6	7.5	5.4	4.4	3.8	6.7
Day	4.8	5.9	7.1	6.6	8.4	8.7	10.2	9.7	7.8	5.8	4.8	4.1	7.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	14.6	14.7	11.8	4.0	2.1	3.4	5.7	7.1	4.5	1.7	1.9	9.1	12.7
	3.25	4.21	2.53	1.20	0.89	1.14	1.23	1.33	0.90	0.67	0.70	1.74	2.34
25	15.9	16.0	12.8	4.4	2.3	3.8	6.2	7.8	4.9	1.9	2.1	9.9	13.8
	3.28	4.26	2.56	1.23	0.92	1.17	1.26	1.35	0.91	0.67	0.70	1.76	2.36
50	16.9	17.0	13.7	4.8	2.5	4.1	6.7	8.3	5.3	2.0	2.3	10.5	14.7
	3.33	4.33	2.62	1.26	0.94	1.20	1.29	1.38	0.92	0.68	0.71	1.80	2.38
100	18.0	18.1	14.6	5.1	2.7	4.4	7.1	8.9	5.6	2.2	2.4	11.2	15.6
	3.33	4.31	2.59	1.23	0.91	1.17	1.26	1.37	0.92	0.68	0.71	1.78	2.38
200	19.2	19.4	15.7	5.6	2.9	4.8	7.7	9.5	5.9	2.3	2.5	12.1	16.8
	3.27	4.23	2.53	1.17	0.87	1.11	1.22	1.33	0.90	0.67	0.70	1.74	2.36
Freq	32.6	37.5	9.3	2.5	1.8	2.1	2.4	2.6	2.0	1.6	1.7	3.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.5	10.4	4.4	2.0	1.2	2.5	4.1	4.9	2.5	1.2	1.8	7.8	9.0
	3.08	4.09	1.43	0.95	0.73	0.99	1.12	1.18	0.75	0.68	0.73	1.88	2.21
25	12.3	12.2	5.4	2.5	1.5	3.0	4.9	5.8	2.9	1.5	2.2	9.1	10.6
	3.15	4.20	1.54	1.01	0.77	1.07	1.17	1.22	0.76	0.70	0.75	1.93	2.25
50	13.7	13.6	6.3	3.0	1.8	3.6	5.7	6.6	3.3	1.8	2.5	10.2	11.8
	3.26	4.38	1.73	1.13	0.86	1.19	1.26	1.28	0.77	0.75	0.77	2.01	2.31
100	15.2	15.3	7.5	3.7	2.3	4.4	6.7	7.6	3.7	2.1	2.9	11.5	13.3
	3.47	4.69	1.84	1.20	0.90	1.26	1.35	1.37	0.80	0.80	0.82	2.15	2.42
200	17.2	17.5	9.3	4.5	2.7	5.4	7.9	8.8	4.1	2.5	3.3	13.2	15.2
	3.40	4.57	1.76	1.15	0.87	1.21	1.31	1.34	0.80	0.77	0.80	2.10	2.42
Freq	38.5	35.4	3.8	2.2	1.7	2.2	2.5	2.5	1.9	1.5	1.9	5.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	9.1	3.7	1.7	1.1	2.2	3.7	4.2	2.0	1.0	2.3	7.6	7.8
	3.10	4.15	1.38	0.92	0.75	0.98	1.13	1.15	0.73	0.68	0.86	2.19	2.22
25	11.0	10.9	4.7	2.2	1.4	2.8	4.5	5.1	2.5	1.3	2.9	9.2	9.5
	3.16	4.26	1.47	0.98	0.80	1.03	1.17	1.19	0.74	0.70	0.88	2.24	2.26
50	12.5	12.5	5.5	2.6	1.8	3.4	5.3	5.9	2.8	1.6	3.3	10.5	10.8
	3.26	4.42	1.63	1.07	0.87	1.13	1.24	1.24	0.75	0.74	0.92	2.32	2.31
100	14.1	14.1	6.6	3.2	2.2	4.2	6.3	6.9	3.3	2.0	4.0	11.9	12.3
	3.44	4.72	1.78	1.17	0.94	1.24	1.36	1.33	0.77	0.80	0.98	2.47	2.42
200	16.0	16.3	8.2	4.0	2.7	5.1	7.4	7.9	3.7	2.3	4.6	13.6	14.1
	3.44	4.67	1.71	1.12	0.90	1.19	1.32	1.30	0.78	0.78	0.97	2.45	2.43
Freq	38.4	32.9	3.7	2.1	1.8	2.2	2.5	2.5	1.9	1.5	2.1	8.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	7.0	2.8	1.3	1.0	1.9	2.9	3.2	1.5	0.7	2.5	6.4	6.1
	3.30	3.93	1.33	0.89	0.80	1.00	1.14	1.12	0.73	0.63	1.04	2.45	2.24
25	9.2	9.1	3.7	1.7	1.4	2.6	3.9	4.1	2.0	0.9	3.3	8.3	8.0
	3.36	4.01	1.40	0.94	0.83	1.05	1.18	1.14	0.73	0.64	1.06	2.50	2.27
50	10.9	10.7	4.5	2.2	1.8	3.2	4.7	4.9	2.3	1.1	4.0	9.7	9.4
	3.45	4.14	1.52	1.01	0.90	1.13	1.24	1.18	0.74	0.67	1.10	2.57	2.32
100	12.6	12.5	5.6	2.7	2.2	4.0	5.6	5.8	2.8	1.4	4.8	11.3	10.9
	3.60	4.36	1.73	1.14	1.01	1.28	1.35	1.25	0.76	0.71	1.17	2.69	2.41
200	14.6	14.5	6.8	3.3	2.7	4.8	6.7	6.8	3.2	1.7	5.6	13.1	12.7
	3.69	4.44	1.66	1.10	0.98	1.24	1.35	1.27	0.78	0.71	1.18	2.75	2.45
Freq	38.2	29.5	3.5	2.0	1.8	2.2	2.5	2.4	1.8	1.6	2.4	12.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	11.2	1443	8.0	545	6.9	355	5.4	170
25	12.2	1848	9.4	859	8.4	620	7.0	364
50	13.0	2211	10.5	1180	9.6	903	8.3	590
100	13.9	2675	11.8	1620	10.9	1288	9.7	908
200	14.9	3318	13.5	2419	12.5	1942	11.3	1402

Madrid

40° 25′ 00″ N	03° 41′ 00″ W	UTM 30	E 442024 m	N 4474306 m	581 m a.s.l.

Location 500 m E of the village of Barajas and E of the city of Madrid. The distance to the suburbs of Madrid is approx. 1 km. The terrain is hilly beyond 1 km in an easterly direction.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1750	0.15	4000	0.30								
30	0.01	1500	0.15	2500	0.30								
60	0.01	1250	0.30										
90	0.01	1000	0.30										
120	0.01	1250	0.30										
150	0.01	750	0.30										
180	0.01	400	0.30										
210	0.01	800	0.30										
240	0.01	1000	0.30										
270	0.01	2500	0.30										
300	0.01	2000	0.30									-2	
330	0.01	4000	0.15									-3	

Height of anemometer: 6.0 m a.g.l. Period: 72060603-85123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	10.3	390	38	152	121	83	58	55	38	27	36	2	1	1	0	3.4	1.24
30	8.8	449	30	100	92	89	71	64	43	32	26	3	0	0	0	3.3	1.25
60	8.0	520	22	76	91	85	65	56	37	23	23	1	1	0	0	2.9	1.14
90	5.8	690	34	93	82	55	20	11	6	6	2	0	0	0	0	1.1	0.80
120	5.7	690	30	115	82	40	22	12	6	2	2	0	0	0	0	1.1	0.81
150	6.7	611	31	113	99	63	31	26	14	6	4	0	0	0	0	1.8	0.97
180	7.8	521	27	119	129	91	42	35	13	13	10	0	0	0	0	2.5	1.19
210	10.6	392	23	106	128	115	85	60	38	27	21	3	1	0	0	3.7	1.46
240	12.6	308	15	61	103	115	103	111	74	54	50	3	0	0	0	5.0	1.84
270	9.1	449	17	60	91	84	77	78	52	36	46	5	3	1	0	3.9	1.31
300	7.1	576	16	52	63	56	46	53	48	36	41	9	1	1	0	2.7	0.97
330	7.5	512	43	149	124	64	34	28	17	11	15	2	1	0	0	2.5	1.12
Total	100.0	483	26	99	103	83	60	55	36	26	26	2	1	0	0	3.1	1.18

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	1.5	2.0	2.3	2.3	1.9	1.7	1.8	1.9	1.2	1.5	1.4	1.8	1.8
3	1.5	1.7	1.9	1.9	1.4	1.2	1.0	1.1	0.7	1.3	1.3	1.6	1.4
6	1.3	1.7	1.7	1.6	1.1	1.0	0.8	0.8	0.6	1.2	1.1	1.6	1.2
9	1.7	2.3	2.9	2.8	2.7	2.2	2.0	1.8	1.5	1.7	1.5	1.8	2.1
12	2.5	3.4	4.0	4.0	4.3	3.3	3.6	3.1	2.8	2.9	2.3	2.9	3.3
15	3.1	4.3	5.0	4.8	4.8	3.9	4.4	4.2	3.5	3.6	2.8	3.5	4.0
18	2.5	3.4	4.5	4.5	4.6	4.0	4.3	3.9	3.0	2.6	2.1	2.6	3.5
21	2.2	2.7	3.2	3.1	2.7	2.6	2.7	2.5	1.7	1.7	1.6	2.0	2.4
Day	2.0	2.7	3.2	3.1	3.0	2.5	2.6	2.4	1.9	2.1	1.8	2.2	2.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	5.5	5.2	3.3	2.0	2.8	4.1	5.8	7.6	7.2	5.3	4.1	5.1
	1.43	1.51	1.44	1.12	0.97	1.10	1.33	1.65	2.01	1.81	1.29	1.20	1.37
25	5.6	6.1	5.7	3.7	2.3	3.1	4.5	6.4	8.3	7.8	5.8	4.5	5.6
	1.48	1.56	1.48	1.16	0.99	1.13	1.38	1.70	2.06	1.87	1.31	1.24	1.41
50	6.0	6.5	6.2	4.0	2.5	3.4	4.9	6.9	8.9	8.4	6.3	4.9	6.1
	1.51	1.60	1.52	1.19	1.02	1.16	1.41	1.74	2.12	1.92	1.35	1.27	1.44
100	6.5	7.1	6.7	4.3	2.6	3.6	5.3	7.5	9.7	9.1	6.7	5.3	6.6
	1.47	1.55	1.47	1.15	0.99	1.13	1.37	1.69	2.06	1.86	1.32	1.23	1.40
200	7.1	7.8	7.3	4.7	2.8	3.9	5.8	8.2	10.6	10.0	7.3	5.7	7.2
	1.39	1.47	1.40	1.10	0.94	1.07	1.30	1.60	1.96	1.77	1.27	1.17	1.35
Freq	9.2	9.4	8.3	6.6	5.8	6.3	7.4	9.6	12.0	10.4	7.8	7.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.8	3.4	1.7	1.4	2.0	2.9	4.2	5.6	4.5	3.3	2.6	3.5
	1.25	1.27	1.18	0.87	0.87	0.97	1.15	1.43	1.78	1.40	1.03	1.07	1.19
25	4.4	4.6	4.1	2.1	1.8	2.5	3.6	5.1	6.6	5.4	3.9	3.2	4.2
	1.35	1.37	1.26	0.93	0.93	1.04	1.24	1.54	1.91	1.49	1.08	1.15	1.26
50	5.2	5.3	4.9	2.5	2.1	3.0	4.2	5.9	7.7	6.3	4.6	3.8	4.9
	1.51	1.54	1.42	1.03	1.04	1.15	1.39	1.73	2.12	1.65	1.16	1.28	1.38
100	6.2	6.4	5.8	3.1	2.6	3.6	5.0	7.1	9.0	7.4	5.4	4.6	5.9
	1.60	1.63	1.50	1.09	1.10	1.23	1.48	1.84	2.27	1.76	1.24	1.36	1.46
200	7.7	7.9	7.2	3.8	3.2	4.4	6.2	8.8	11.1	9.1	6.4	5.7	7.2
	1.53	1.56	1.44	1.05	1.05	1.17	1.41	1.76	2.17	1.69	1.20	1.30	1.41
Freq	9.9	9.0	8.1	6.1	5.7	6.5	7.6	10.3	12.4	9.6	7.3	7.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.3	2.9	1.2	1.1	1.8	2.6	3.7	4.9	3.8	2.7	2.3	3.0
	1.26	1.27	1.16	0.82	0.82	0.98	1.18	1.47	1.84	1.35	1.00	1.12	1.19
25	4.1	4.1	3.7	1.6	1.4	2.3	3.3	4.7	6.1	4.7	3.4	2.9	3.8
	1.35	1.35	1.24	0.87	0.87	1.04	1.26	1.57	1.96	1.44	1.04	1.19	1.25
50	4.8	4.8	4.4	2.0	1.8	2.7	4.0	5.5	7.1	5.6	4.0	3.5	4.5
	1.48	1.49	1.37	0.95	0.95	1.14	1.39	1.74	2.15	1.57	1.10	1.31	1.35
100	5.8	5.8	5.3	2.4	2.2	3.3	4.8	6.6	8.4	6.6	4.8	4.3	5.4
	1.63	1.64	1.50	1.04	1.04	1.25	1.52	1.90	2.36	1.72	1.20	1.43	1.46
200	7.2	7.2	6.5	2.9	2.7	4.1	5.8	8.1	10.3	8.0	5.6	5.2	6.6
	1.56	1.57	1.44	0.99	1.00	1.20	1.46	1.83	2.26	1.65	1.16	1.37	1.42
Freq	10.1	8.9	8.0	5.9	5.7	6.6	7.7	10.5	12.5	9.3	7.2	7.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	2.6	2.2	0.9	0.9	1.4	2.2	3.0	3.9	2.9	2.1	1.8	2.4
	1.28	1.27	1.15	0.82	0.84	0.98	1.22	1.49	1.82	1.30	0.99	1.10	1.19
25	3.5	3.4	3.0	1.3	1.3	1.9	2.9	4.0	5.1	3.8	2.8	2.4	3.2
	1.36	1.35	1.21	0.86	0.89	1.03	1.29	1.58	1.92	1.37	1.03	1.17	1.24
50	4.2	4.2	3.7	1.6	1.6	2.4	3.5	4.9	6.1	4.6	3.4	3.0	3.9
	1.47	1.46	1.31	0.93	0.95	1.12	1.39	1.71	2.07	1.47	1.08	1.26	1.33
100	5.2	5.1	4.5	2.0	2.0	3.0	4.4	5.9	7.3	5.6	4.1	3.7	4.7
	1.67	1.66	1.48	1.04	1.07	1.26	1.58	1.94	2.35	1.66	1.18	1.43	1.47
200	6.3	6.2	5.5	2.4	2.5	3.6	5.3	7.2	8.9	6.7	4.9	4.5	5.7
	1.61	1.60	1.43	1.01	1.04	1.21	1.52	1.87	2.27	1.61	1.17	1.38	1.43
Freq	10.2	8.7	7.8	5.8	5.8	6.7	8.0	10.7	12.4	8.9	7.2	7.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.7	198	3.3	88	2.9	58	2.2	28
25	5.1	249	3.9	133	3.5	98	2.9	58
50	5.5	298	4.5	174	4.1	137	3.5	90
100	6.0	393	5.3	263	4.9	202	4.3	134
200	6.6	564	6.6	525	6.0	391	5.2	251

Málaga

36° 43′ 00″ N 04° 25′ 00″ W	UTM 30 E 373475 m N 4064443 m	7 m a.s.l.

Location in the airport of Málaga, 5 km SW of the suburbs of the city. The terrain is flat and slopes gently towards the sea which is 2 km to the SE. To the N, at a distance of more than 5 km, the foothills of the Sistema Penibético rise to heights of approx. 250 m a.s.l.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	250	0.30									-5	-2
30	0.05	250	0.30									-7	
60	0.05	500	0.30	4000	0.00	10000	0.30					-5	1
90	0.25	2500	0.00									-2	1
120	0.20	2000	0.00									-1	
150	0.20	2250	0.00									-2	-1
180	0.20	3500	0.00									-5	-1
210	0.03	500	0.30	8000	0.00							-6	
240	0.01	600	0.30									-5	2
270	0.01	1750	0.30									-2	2
300	0.01	1500	0.05	3000	0.30							-1	
330	0.03	400	0.30									-2	-2

Height of anemometer: 6.0 m a.g.l. Period: 72060806-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.4	736	11	47	58	32	32	20	16	18	22	3	2	0	2	1.1	0.64
30	2.7	917	3	18	21	8	9	9	1	2	6	2	1	1	0	0.3	0.51
60	2.9	904	10	30	34	10	9	2	0	0	1	0	0	0	0	0.6	0.73
90	3.9	715	26	86	72	41	22	15	9	6	7	1	0	0	0	1.0	0.72
120	4.2	614	24	78	86	66	30	29	22	13	22	6	7	2	2	2.1	0.83
150	15.8	160	53	186	239	159	102	46	23	11	14	3	3	0	0	4.1	1.87
180	9.9	263	32	131	183	159	116	65	25	15	9	1	0	0	0	4.1	1.97
210	4.5	609	13	57	73	60	57	38	33	27	24	5	3	1	0	2.3	0.92
240	3.5	693	18	56	55	44	32	23	29	13	27	5	3	1	0	1.4	0.73
270	5.6	486	23	71	68	57	53	39	54	38	71	25	10	4	0	3.6	1.06
300	13.6	180	27	105	139	104	82	83	74	63	107	25	8	2	0	5.7	1.67
330	30.0	87	36	129	169	154	109	78	58	48	88	30	11	2	0	5.5	1.62
Total	100.0	310	31	113	144	115	82	56	41	31	52	15	6	1	0	4.3	1.39

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.5	3.8	3.0	2.3	1.8	1.8	1.7	1.2	1.8	2.5	3.4	3.9	2.5
3	4.2	4.1	3.8	2.8	3.1	3.3	2.8	2.7	2.6	3.3	4.3	4.3	3.4
6	4.2	4.2	4.4	3.0	3.1	3.2	3.2	2.9	3.3	3.7	4.2	4.4	3.6
9	4.9	4.7	4.9	3.5	3.6	3.2	3.0	2.5	3.2	4.0	4.4	4.5	3.8
12	4.6	5.0	5.5	4.8	4.9	4.9	4.6	4.7	4.2	4.3	4.0	4.5	4.7
15	4.6	5.3	5.3	4.9	5.4	5.3	5.0	4.8	4.8	4.6	4.2	4.6	4.9
18	2.6	3.2	3.8	3.3	4.1	4.1	3.9	3.5	2.6	2.2	2.4	2.9	3.2
21	3.0	3.1	2.3	1.6	1.5	1.2	1.3	1.1	1.1	1.6	2.6	3.3	2.0
Day	4.0	4.2	4.1	3.3	3.4	3.4	3.2	2.9	3.0	3.3	3.7	4.0	3.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.0	1.6	1.4	1.4	3.0	7.0	7.3	5.8	3.3	5.7	8.7	10.1	7.2
	1.57	0.61	0.77	0.66	0.80	1.78	1.92	1.32	0.88	1.14	1.81	1.77	1.36
25	9.8	1.7	1.5	1.6	3.4	7.6	8.0	6.3	3.7	6.3	9.5	11.0	7.8
	1.58	0.62	0.80	0.67	0.81	1.83	1.98	1.35	0.88	1.15	1.84	1.79	1.38
50	10.4	1.9	1.7	1.8	3.6	8.2	8.6	6.8	3.9	6.7	10.1	11.8	8.4
	1.61	0.62	0.81	0.69	0.82	1.88	2.04	1.39	0.90	1.18	1.89	1.82	1.40
100	11.1	2.0	1.8	1.9	3.8	8.9	9.3	7.3	4.2	7.1	10.9	12.5	9.0
	1.60	0.62	0.79	0.67	0.81	1.82	1.97	1.35	0.90	1.17	1.86	1.81	1.40
200	11.9	2.1	1.9	2.0	4.1	9.8	10.3	8.0	4.5	7.6	11.7	13.4	9.7
	1.57	0.62	0.76	0.65	0.80	1.73	1.87	1.29	0.88	1.14	1.80	1.78	1.37
Freq	10.7	3.3	3.0	3.6	4.0	12.4	11.6	6.2	4.0	5.2	11.2	24.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	0.8	0.8	1.2	2.3	4.8	5.1	2.8	2.0	4.3	6.3	7.3	5.0
	1.08	0.58	0.72	0.64	0.76	1.56	1.64	0.87	0.75	1.10	1.69	1.63	1.24
25	5.3	1.0	1.0	1.5	2.8	5.8	6.1	3.3	2.4	5.1	7.4	8.6	5.9
	1.10	0.59	0.76	0.67	0.78	1.68	1.77	0.90	0.77	1.13	1.76	1.67	1.28
50	6.0	1.2	1.3	1.8	3.2	6.8	7.1	3.9	2.7	5.8	8.4	9.6	6.7
	1.14	0.62	0.84	0.73	0.81	1.88	1.99	0.96	0.80	1.18	1.88	1.74	1.34
100	6.9	1.4	1.5	2.2	3.7	8.1	8.5	4.6	3.2	6.6	9.7	10.8	7.8
	1.21	0.65	0.88	0.77	0.86	2.01	2.12	1.02	0.84	1.26	2.02	1.85	1.43
200	7.8	1.6	1.9	2.7	4.2	10.0	10.5	5.4	3.6	7.6	11.3	12.3	9.2
	1.19	0.63	0.85	0.74	0.84	1.92	2.02	0.99	0.83	1.23	1.96	1.81	1.42
Freq	5.2	2.9	3.0	3.8	4.0	15.0	10.4	4.9	3.7	5.7	12.9	28.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	0.6	0.5	1.2	2.7	4.2	4.4	2.3	2.0	4.1	5.6	6.3	4.3
	0.99	0.56	0.62	0.67	0.92	1.56	1.61	0.83	0.79	1.20	1.69	1.64	1.24
25	4.3	0.8	0.7	1.5	3.4	5.2	5.4	2.8	2.4	5.0	6.8	7.7	5.3
	1.01	0.58	0.65	0.70	0.95	1.67	1.72	0.86	0.80	1.23	1.75	1.67	1.28
50	4.9	0.9	0.9	1.9	4.0	6.2	6.4	3.3	2.8	5.8	7.9	8.8	6.2
	1.04	0.60	0.70	0.75	1.01	1.85	1.90	0.90	0.83	1.29	1.85	1.73	1.34
100	5.7	1.2	1.1	2.4	4.8	7.4	7.7	4.0	3.3	6.7	9.1	10.0	7.2
	1.09	0.63	0.76	0.81	1.10	2.03	2.09	0.98	0.88	1.39	2.01	1.83	1.43
200	6.4	1.3	1.4	2.8	5.6	9.1	9.4	4.6	3.8	7.8	10.6	11.4	8.5
	1.09	0.62	0.73	0.79	1.06	1.94	2.00	0.95	0.87	1.36	1.96	1.83	1.43
Freq	4.7	2.9	3.0	3.8	4.8	14.8	10.0	4.7	3.9	6.3	13.8	27.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	0.4	0.5	0.9	2.6	3.4	3.4	1.8	1.8	3.5	4.5	5.0	3.4
	0.94	0.52	0.63	0.66	1.11	1.59	1.55	0.83	0.85	1.31	1.70	1.66	1.26
25	3.3	0.5	0.7	1.3	3.5	4.4	4.5	2.3	2.3	4.6	5.9	6.5	4.5
	0.96	0.53	0.65	0.68	1.16	1.69	1.64	0.85	0.87	1.34	1.74	1.69	1.29
50	3.9	0.6	0.9	1.6	4.3	5.4	5.4	2.8	2.8	5.4	7.0	7.7	5.4
	0.98	0.55	0.70	0.71	1.24	1.83	1.78	0.88	0.89	1.39	1.81	1.74	1.34
100	4.6	0.8	1.1	2.0	5.2	6.5	6.6	3.5	3.4	6.4	8.2	8.9	6.4
	1.02	0.57	0.77	0.77	1.38	2.08	2.03	0.95	0.94	1.49	1.94	1.82	1.42
200	5.4	0.9	1.4	2.3	6.2	8.0	8.1	4.1	4.0	7.6	9.6	10.4	7.6
	1.04	0.58	0.75	0.76	1.35	2.01	1.96	0.95	0.95	1.51	1.96	1.86	1.45
Freq	4.5	2.9	3.1	3.9	6.2	14.2	9.4	4.6	4.1	7.1	15.6	24.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	550	4.6	231	4.1	151	3.2	73
25	7.2	699	5.5	355	4.9	259	4.2	153
50	7.6	825	6.2	473	5.7	365	4.9	242
100	8.2	1024	7.1	637	6.6	504	5.8	357
200	8.9	1336	8.3	1044	7.7	821	6.9	574

Menorca

39° 53′ 00″ N 04° 15′ 00″ E	UTM 31 E 606887 m N 4415632 m	82 m a.s.l.

Located at the airport of Mahón on the island of Menorca (Islas Baleares). Elevations within 5 km of the station are less than 150 m a.s.l.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	400	0.30										
30	0.01	500	0.30										
60	0.01	600	0.30										
90	0.01	500	0.30										
120	0.01	500	0.30										
150	0.01	750	0.30	8000	0.00								
180	0.01	2000	0.20	5000	0.00								
210	0.01	750	0.20	5000	0.00								
240	0.01	500	0.20	5000	0.00								
270	0.01	500	0.20	8000	0.00								
300	0.01	400	0.20										
330	0.01	500	0.20										

Height of anemometer: 6.0 m a.g.l. Period: 72060603-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	14.6	123	45	89	82	86	63	82	97	80	129	56	44	15	9	7.5	1.91
30	13.3	123	38	92	110	101	100	107	113	75	88	32	11	7	4	6.5	1.99
60	7.5	220	51	115	143	121	100	76	75	44	45	9	1	1	0	4.7	1.68
90	6.8	261	66	151	164	103	96	59	49	23	22	2	3	1	0	4.0	1.53
120	5.2	338	56	111	139	92	79	69	70	22	17	6	2	0	1	3.9	1.42
150	4.9	391	48	108	131	118	72	50	46	22	8	4	0	0	0	3.5	1.44
180	7.1	229	69	139	195	134	89	60	49	22	12	0	1	0	0	4.1	1.79
210	9.5	213	42	114	159	113	96	88	95	39	36	4	1	0	0	4.7	1.76
240	10.8	164	38	104	152	114	108	100	102	54	46	7	10	0	0	5.4	1.85
270	6.7	265	62	116	122	80	79	104	69	37	45	14	5	3	0	4.5	1.44
300	7.1	251	114	154	132	79	55	41	69	40	44	15	3	2	2	3.9	1.22
330	6.4	265	79	166	121	72	51	58	67	41	49	16	11	3	3	4.0	1.18
Total	100.0	212	55	116	133	101	84	79	81	48	55	18	11	4	2	5.0	1.50

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.2	4.2	3.4	3.5	2.2	2.2	1.8	2.0	2.1	4.0	4.0	5.1	3.0
3	3.2	6.8	4.0	3.2	3.0	2.5	2.4	2.1	2.6	3.8	3.4	5.7	3.0
6	4.3	4.4	4.0	3.5	2.9	2.9	2.7	2.5	2.2	3.2	3.8	4.2	3.4
9	4.6	5.4	5.7	5.8	5.2	5.2	5.3	4.8	4.4	4.9	4.4	4.8	5.0
12	6.4	6.8	6.5	6.6	5.9	5.7	5.9	5.4	5.6	6.1	5.7	6.2	6.0
15	6.4	6.3	6.2	6.2	5.5	5.4	5.4	5.2	5.1	5.5	5.8	5.9	5.7
18	4.2	4.5	4.4	4.6	4.1	4.5	4.1	4.1	3.4	3.3	3.6	4.2	4.1
21	3.8	3.7	3.4	2.7	2.3	2.3	1.9	2.1	2.1	3.2	3.3	4.3	2.9
Day	4.9	5.2	5.0	4.8	4.2	4.2	4.1	3.8	3.7	4.3	4.4	5.0	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	11.9	11.4	9.1	7.2	6.8	5.3	5.3	6.3	7.3	6.9	6.7	6.6	8.0
	1.88	1.89	1.83	1.85	1.72	1.40	1.70	1.74	1.81	1.58	1.44	1.30	1.51
25	12.9	12.4	9.9	7.9	7.5	5.8	5.8	6.8	7.9	7.6	7.4	7.2	8.8
	1.89	1.91	1.85	1.90	1.76	1.44	1.76	1.79	1.87	1.62	1.46	1.32	1.53
50	13.8	13.1	10.6	8.5	8.0	6.3	6.2	7.4	8.5	8.1	7.9	7.7	9.4
	1.91	1.94	1.90	1.96	1.81	1.48	1.80	1.84	1.91	1.67	1.50	1.35	1.56
100	14.6	14.0	11.3	9.2	8.6	6.8	6.7	8.0	9.3	8.8	8.4	8.2	10.1
	1.92	1.94	1.87	1.90	1.76	1.44	1.74	1.78	1.85	1.62	1.47	1.33	1.56
200	15.6	14.9	12.2	10.1	9.5	7.4	7.4	8.8	10.2	9.6	9.1	8.8	10.9
	1.89	1.90	1.82	1.81	1.68	1.36	1.65	1.69	1.76	1.54	1.42	1.30	1.54
Freq	12.4	13.6	9.1	7.0	5.7	5.0	6.5	8.8	10.5	7.8	6.9	6.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.0	7.9	5.8	4.8	4.7	3.4	3.7	4.4	5.1	4.6	4.6	4.7	5.6
	1.87	1.76	1.67	1.55	1.44	1.19	1.50	1.48	1.55	1.27	1.24	1.20	1.38
25	10.5	9.3	6.8	5.8	5.6	4.1	4.4	5.3	6.2	5.5	5.5	5.6	6.7
	1.90	1.79	1.76	1.67	1.53	1.28	1.62	1.59	1.67	1.35	1.29	1.24	1.43
50	11.7	10.4	7.8	6.8	6.5	4.8	5.2	6.2	7.2	6.3	6.3	6.4	7.6
	1.95	1.86	1.91	1.88	1.69	1.43	1.81	1.79	1.87	1.48	1.37	1.30	1.52
100	13.0	11.6	9.1	8.0	7.7	5.8	6.1	7.4	8.5	7.5	7.2	7.3	8.8
	2.05	1.98	2.05	2.00	1.80	1.52	1.93	1.90	1.99	1.58	1.47	1.39	1.63
200	14.6	13.1	10.9	9.9	9.3	7.2	7.6	9.2	10.6	9.0	8.4	8.4	10.5
	2.03	1.94	1.98	1.91	1.73	1.46	1.84	1.81	1.90	1.52	1.42	1.35	1.65
Freq	14.2	13.4	7.8	6.8	5.3	4.9	7.1	9.4	10.8	6.8	7.1	6.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	6.8	4.9	4.2	4.0	2.9	3.2	3.9	4.5	3.9	4.0	4.3	4.9
	1.88	1.76	1.69	1.54	1.42	1.21	1.48	1.51	1.55	1.25	1.22	1.20	1.38
25	9.4	8.3	6.0	5.2	5.0	3.7	4.0	4.9	5.6	4.8	4.9	5.3	6.0
	1.91	1.80	1.78	1.65	1.51	1.29	1.58	1.61	1.65	1.31	1.26	1.23	1.43
50	10.7	9.4	7.0	6.1	5.9	4.4	4.8	5.8	6.5	5.7	5.7	6.0	7.0
	1.96	1.85	1.93	1.82	1.65	1.43	1.74	1.78	1.82	1.42	1.33	1.27	1.50
100	12.1	10.7	8.2	7.3	7.0	5.3	5.7	6.9	7.8	6.8	6.6	7.0	8.1
	2.04	1.96	2.12	2.00	1.81	1.56	1.92	1.96	2.00	1.56	1.45	1.37	1.62
200	13.7	12.2	9.9	9.0	8.5	6.5	7.0	8.5	9.6	8.1	7.7	8.0	9.6
	2.06	1.96	2.04	1.91	1.74	1.50	1.83	1.87	1.92	1.50	1.40	1.35	1.65
Freq	14.6	13.1	7.5	6.7	5.2	5.1	7.2	9.6	10.6	6.7	7.1	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	5.3	3.8	3.3	3.1	2.4	2.6	3.1	3.5	3.0	3.1	4.0	3.8
	1.88	1.74	1.69	1.53	1.41	1.27	1.48	1.49	1.52	1.22	1.23	1.31	1.38
25	7.8	6.8	5.0	4.3	4.1	3.1	3.5	4.2	4.6	4.0	4.1	5.2	5.0
	1.91	1.77	1.77	1.62	1.49	1.34	1.56	1.58	1.61	1.27	1.26	1.34	1.43
50	9.2	8.0	6.0	5.2	4.9	3.8	4.2	5.0	5.6	4.8	4.9	6.2	6.0
	1.95	1.82	1.90	1.76	1.60	1.45	1.70	1.71	1.74	1.35	1.31	1.38	1.49
100	10.7	9.4	7.1	6.3	6.0	4.7	5.1	6.1	6.8	5.8	5.9	7.2	7.2
	2.02	1.91	2.13	2.00	1.81	1.65	1.93	1.94	1.98	1.50	1.41	1.44	1.60
200	12.3	10.8	8.6	7.7	7.3	5.7	6.3	7.5	8.2	7.0	6.9	8.4	8.5
	2.07	1.95	2.07	1.92	1.75	1.59	1.86	1.87	1.91	1.47	1.42	1.47	1.64
Freq	14.4	12.4	7.4	6.5	5.2	5.3	7.5	9.7	10.1	6.7	7.0	7.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	623	5.1	259	4.5	169	3.5	81
25	7.9	794	6.1	399	5.5	290	4.6	171
50	8.4	940	6.9	534	6.3	412	5.4	271
100	9.0	1165	7.9	731	7.3	579	6.4	404
200	9.8	1508	9.4	1194	8.6	936	7.6	650

Murcia

37° 58′ 00″ N	01° 14′ 00″ W	UTM 30	E 655191 m	N 4203658 m	75 m a.s.l.

Location in the SW–NE oriented valley between Sierra de Carrascoy (>500 m) 100 km to the SE and an area of smaller hills 3-4 km to the NW. The airport is situated in the suburbs of the city of Alcantarilla and is thus surrounded by built-up areas, except in the sectors W, NW and N. The anemometer is mounted 7.7 m above the roof of a 3.2 m high building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.10									-2	
30	0.10	1000	0.30									-15	
60	0.10	1000	0.30									-17	
90	0.10	600	0.30									-16	
120	0.20	1000	0.05	5000	0.20							-20	
150	0.20	2000	0.05	4000	0.20							-17	
180	0.10	500	0.30	2000	0.05	5000	0.20					-6	
210	0.10	2000	0.05	7000	0.20							-13	
240	0.10	300	0.01	3000	0.10							-21	
270	0.01	500	0.10									-20	
300	0.01	500	0.10									-6	
330	0.01	500	0.10										

Height of anemometer: 10.9 m a.g.l. Period: 72060612–82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.4	307	16	92	173	193	109	57	16	13	22	1	0	1	0	4.2	1.90
30	10.0	168	8	49	136	138	150	113	90	48	69	18	7	6	0	6.0	2.03
60	15.3	101	6	46	105	184	143	146	110	55	90	11	2	2	0	6.3	2.35
90	8.5	223	15	102	127	204	148	104	38	15	13	8	0	1	0	4.8	2.29
120	7.1	248	14	78	155	176	177	96	41	9	5	0	0	0	0	4.6	2.43
150	6.3	257	16	84	117	164	141	117	70	27	6	0	0	0	0	4.8	2.29
180	5.3	272	38	121	145	139	113	94	56	14	8	1	0	0	0	4.2	1.89
210	9.4	158	40	82	144	192	120	107	81	41	32	2	1	0	0	5.2	2.17
240	7.9	173	66	188	218	181	86	34	21	18	11	1	1	1	0	4.0	1.90
270	8.0	189	60	238	223	134	58	36	30	13	15	4	0	0	0	3.8	1.69
300	9.4	149	71	228	146	105	83	67	49	28	55	9	7	5	0	4.3	1.36
330	7.4	187	39	149	205	180	80	47	41	24	41	6	0	1	0	4.4	1.68
Total	100.0	187	31	117	153	166	119	90	60	29	37	6	2	2	0	4.9	1.89

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	2.8	3.0	3.0	3.1	2.6	2.5	2.8	2.8	2.3	2.6	3.0	2.7	2.8
9	3.2	3.9	4.4	4.6	4.2	4.1	4.2	3.9	3.5	3.9	3.5	3.5	3.9
12	4.5	4.7	5.7	6.0	6.0	6.0	5.9	5.4	5.0	4.9	4.5	4.5	5.3
15	4.6	5.7	6.2	6.6	6.4	6.5	6.4	6.3	5.8	5.6	5.0	4.7	5.8
18	3.5	4.7	5.4	5.7	5.7	5.5	5.5	5.5	4.8	4.6	3.6	3.1	4.8
21	2.4	2.1	3.6	3.8	3.8	3.7	4.1	4.2	3.1	3.0	3.4	1.8	3.6
Day	3.8	4.4	4.9	5.2	4.9	4.9	4.9	4.8	4.2	4.3	3.9	3.7	4.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.4	10.6	12.6	11.2	9.8	9.9	8.5	9.3	8.1	7.1	6.9	6.7	9.2
	2.15	1.88	2.40	2.37	2.69	2.63	2.25	2.43	2.22	2.06	1.65	1.78	1.94
25	7.0	11.5	13.7	12.2	10.7	10.9	9.3	10.1	8.9	7.8	7.6	7.3	10.1
	2.21	1.90	2.42	2.40	2.75	2.69	2.31	2.49	2.29	2.13	1.69	1.83	1.97
50	7.6	12.3	14.6	13.0	11.4	11.6	9.9	10.8	9.6	8.3	8.1	7.8	10.8
	2.27	1.93	2.46	2.45	2.83	2.77	2.37	2.56	2.35	2.18	1.73	1.88	2.02
100	8.2	13.1	15.5	13.9	12.3	12.5	10.7	11.7	10.4	9.0	8.7	8.5	11.6
	2.20	1.92	2.45	2.43	2.76	2.70	2.31	2.50	2.28	2.11	1.69	1.82	2.01
200	9.1	14.0	16.6	15.0	13.5	13.6	11.8	12.8	11.4	10.0	9.5	9.4	12.6
	2.08	1.88	2.41	2.37	2.65	2.60	2.20	2.39	2.17	2.00	1.62	1.73	1.97
Freq	6.1	8.4	13.5	10.7	7.6	6.6	5.7	8.0	8.4	7.9	9.0	8.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	8.3	9.1	7.4	6.9	7.1	5.5	6.7	5.3	4.8	4.8	4.5	6.5
	1.84	1.94	2.29	2.22	2.38	2.26	1.86	2.12	1.85	1.69	1.38	1.60	1.76
25	5.3	9.7	10.7	8.8	8.1	8.4	6.6	7.9	6.3	5.8	5.7	5.4	7.7
	1.98	1.98	2.35	2.32	2.53	2.38	2.01	2.24	2.00	1.82	1.46	1.72	1.83
50	6.1	10.8	11.9	9.9	9.3	9.5	7.6	9.0	7.3	6.7	6.6	6.3	8.8
	2.23	2.06	2.43	2.48	2.77	2.58	2.26	2.44	2.25	2.05	1.59	1.94	1.96
100	7.3	12.1	13.4	11.3	10.8	11.0	9.0	10.4	8.7	8.0	7.7	7.5	10.1
	2.37	2.20	2.60	2.67	2.97	2.77	2.40	2.62	2.40	2.17	1.71	2.06	2.12
200	9.0	13.8	15.2	13.3	13.2	13.1	11.2	12.6	10.8	9.9	9.2	9.4	12.1
	2.27	2.15	2.54	2.58	2.85	2.67	2.30	2.52	2.29	2.08	1.64	1.97	2.13
Freq	5.6	9.4	14.7	9.2	7.3	6.4	5.5	8.9	8.1	8.0	9.4	7.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	7.4	8.0	6.2	6.0	6.2	4.6	5.8	4.4	4.2	4.1	4.0	5.7
	1.88	2.00	2.33	2.27	2.40	2.26	1.85	2.14	1.85	1.67	1.37	1.67	1.76
25	4.8	8.9	9.7	7.6	7.3	7.5	5.7	7.2	5.5	5.2	5.1	4.9	6.9
	2.01	2.05	2.38	2.37	2.54	2.37	1.98	2.25	1.98	1.79	1.43	1.79	1.83
50	5.6	10.1	11.0	8.8	8.5	8.7	6.7	8.3	6.5	6.1	6.0	5.8	8.0
	2.22	2.11	2.46	2.53	2.76	2.54	2.19	2.42	2.20	1.98	1.54	1.98	1.94
100	6.6	11.5	12.5	10.2	10.0	10.1	8.0	9.7	7.7	7.3	7.0	6.9	9.3
	2.44	2.24	2.61	2.78	3.03	2.79	2.41	2.66	2.41	2.17	1.69	2.17	2.11
200	8.2	13.2	14.2	12.1	12.1	12.1	9.9	11.6	9.5	9.0	8.4	8.5	11.1
	2.34	2.23	2.60	2.69	2.91	2.69	2.31	2.56	2.31	2.08	1.63	2.08	2.13
Freq	5.4	9.7	15.1	8.7	7.1	6.3	5.4	9.3	7.9	8.0	9.5	7.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	5.8	6.2	4.8	4.7	4.7	3.8	4.5	3.5	3.3	3.2	3.1	4.4
	1.58	2.04	2.32	2.28	2.40	2.20	1.92	2.08	1.85	1.62	1.37	1.67	1.76
25	4.4	7.5	8.0	6.2	6.1	6.2	4.9	5.9	4.6	4.3	4.2	4.1	5.8
	1.67	2.08	2.37	2.37	2.51	2.30	2.03	2.18	1.96	1.71	1.42	1.77	1.82
50	5.4	8.9	9.4	7.4	7.3	7.4	6.0	7.0	5.5	5.2	5.1	4.9	6.9
	1.82	2.14	2.43	2.51	2.69	2.43	2.21	2.32	2.13	1.86	1.51	1.93	1.92
100	6.5	10.3	11.0	8.8	8.7	8.7	7.2	8.3	6.6	6.3	6.1	6.0	8.2
	2.07	2.24	2.55	2.78	3.02	2.69	2.52	2.58	2.43	2.12	1.68	2.19	2.08
200	8.0	12.0	12.7	10.5	10.5	10.4	8.8	10.0	8.1	7.7	7.3	7.3	9.8
	1.99	2.29	2.60	2.75	2.94	2.65	2.42	2.53	2.34	2.04	1.65	2.12	2.12
Freq	5.6	10.4	14.8	8.4	7.0	6.3	5.7	9.3	7.9	8.3	9.2	7.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.2	660	5.8	260	5.0	171	3.9	82
25	8.9	842	6.8	409	6.1	298	5.1	175
50	9.5	1006	7.8	560	7.1	433	6.1	282
100	10.2	1255	9.0	799	8.3	628	7.3	433
200	11.1	1639	10.7	1339	9.8	1043	8.7	718

Palma de Mallorca

39° 33′ 00″ N 02° 44′ 00″ E	UTM 31 E 477087 m N 4377922 m	4 m a.s.l.

Location at the airport Son San Juan, E of the suburbs of the city of Palma de Mallorca (Islas Baleares). To the S and SW is the bay Bahía de Palma. About 15 km to the NW is the SW-NE oriented mountain range Sierra de Alfabia with heights of more than 1000 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.30										
30	0.01	600	0.30										
60	0.01	2000	0.05	4500	0.30								
90	0.01	1250	0.30	2150	0.01	8500	0.30						
120	0.01	1000	0.10	3000	0.30								
150	0.01	1000	0.30	2000	0.00	6000	0.05						
180	0.01	600	0.30	1500	0.00								
210	0.01	500	0.10	1000	0.00								
240	0.01	500	0.20	1000	0.00								
270	0.01	250	0.10	500	0.30	1700	0.00	8000	0.30				
300	0.01	1000	0.30										
330	0.01	500	0.10	3000	0.30								

Height of anemometer: 6.0 m a.g.l. Period: 72060606–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.3	869	8	40	34	17	10	6	10	4	3	0	0	0	0	0.3	0.50
30	6.0	607	22	53	82	52	50	46	44	18	20	5	1	1	0	2.2	0.92
60	16.0	239	28	113	144	112	95	101	90	31	39	4	1	0	0	4.7	1.76
90	7.5	491	31	120	115	91	64	45	25	11	4	1	0	1	0	2.7	1.23
120	4.5	822	27	49	38	23	23	12	5	2	1	0	0	0	0	0.4	0.55
150	4.6	811	15	34	65	28	23	19	3	2	0	1	0	0	0	0.5	0.57
180	4.4	804	13	46	50	23	21	17	20	2	3	0	0	0	0	0.5	0.57
210	13.7	267	14	81	136	136	132	123	73	17	21	1	0	0	0	4.8	2.07
240	16.1	230	12	77	125	132	127	128	98	31	37	3	0	0	0	5.2	2.15
270	7.7	509	15	69	103	76	55	55	49	20	40	7	1	0	0	3.2	1.15
300	8.4	444	13	69	88	94	77	77	70	25	33	8	1	0	0	3.8	1.35
330	6.7	547	13	53	58	59	70	72	62	16	38	10	2	1	0	3.1	1.07
Total	100.0	445	18	76	103	90	80	78	60	19	25	4	1	0	0	3.6	1.36

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	2.0	1.5	1.4	1.2	0.8	1.1	0.8	0.7	0.7	1.6	1.4	2.3	1.3
3	1.9	2.0	1.5	1.0	0.9	0.9	0.6	0.7	0.5	1.6	1.4	2.5	1.3
6	1.9	1.8	1.4	1.3	1.2	1.2	0.9	0.8	0.6	1.5	1.2	2.2	1.3
9	2.1	2.2	2.7	3.4	3.5	3.6	3.2	2.8	2.2	2.8	1.8	2.4	2.7
12	4.4	4.8	5.3	5.4	5.5	6.0	5.9	5.5	4.9	4.8	4.2	4.8	5.1
15	4.9	5.4	5.6	5.6	5.5	6.1	6.5	5.9	5.5	5.2	4.7	5.1	5.5
18	2.9	3.4	3.5	4.1	4.0	4.7	4.8	4.5	3.4	2.9	2.1	3.0	3.6
21	2.1	1.9	1.7	1.6	1.6	1.8	1.6	1.2	1.1	1.7	1.4	2.4	1.7
Day	2.8	2.9	2.9	3.0	2.9	3.2	3.1	2.8	2.4	2.8	2.3	3.1	2.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.7	3.2	7.2	5.6	2.0	1.3	1.0	5.6	6.4	6.1	6.1	5.6	5.1
	0.71	0.94	2.05	1.72	0.92	0.82	0.67	1.90	2.13	1.79	1.53	1.32	1.41
25	1.9	3.5	7.9	6.2	2.2	1.5	1.2	6.1	7.0	6.7	6.7	6.2	5.6
	0.72	0.95	2.11	1.77	0.94	0.84	0.69	1.96	2.20	1.84	1.58	1.35	1.44
50	2.0	3.8	8.5	6.6	2.4	1.6	1.3	6.6	7.5	7.2	7.2	6.6	6.1
	0.74	0.98	2.17	1.82	0.96	0.86	0.70	2.01	2.26	1.89	1.62	1.39	1.47
100	2.1	4.1	9.2	7.2	2.6	1.7	1.3	7.1	8.1	7.8	7.8	7.1	6.5
	0.73	0.96	2.10	1.76	0.94	0.84	0.69	1.95	2.19	1.83	1.58	1.36	1.44
200	2.3	4.3	10.2	7.9	2.8	1.8	1.4	7.9	9.0	8.6	8.5	7.7	7.2
	0.71	0.93	1.99	1.67	0.89	0.80	0.66	1.85	2.07	1.74	1.50	1.31	1.38
Freq	4.9	5.6	13.5	9.6	5.3	4.6	4.5	11.4	15.5	9.7	8.2	7.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.6	2.6	5.1	2.9	0.7	0.5	0.4	4.1	4.5	3.5	4.4	3.6	3.4
	0.61	0.92	1.79	1.25	0.65	0.60	0.51	1.73	1.79	1.17	1.36	1.08	1.21
25	0.8	3.2	6.2	3.6	0.9	0.7	0.5	4.9	5.4	4.3	5.3	4.3	4.2
	0.64	0.96	1.94	1.34	0.69	0.63	0.53	1.86	1.93	1.26	1.45	1.13	1.28
50	1.0	3.7	7.1	4.2	1.1	0.9	0.7	5.7	6.3	5.0	6.2	5.0	4.9
	0.70	1.04	2.18	1.51	0.76	0.69	0.58	2.09	2.17	1.40	1.60	1.21	1.38
100	1.3	4.4	8.5	5.0	1.4	1.1	0.8	6.8	7.5	6.0	7.3	5.8	5.8
	0.74	1.11	2.32	1.60	0.80	0.72	0.60	2.23	2.31	1.49	1.71	1.30	1.46
200	1.6	5.2	10.5	6.2	1.7	1.3	1.0	8.4	9.3	7.4	8.9	6.9	7.1
	0.71	1.07	2.21	1.53	0.77	0.70	0.58	2.13	2.21	1.42	1.64	1.26	1.42
Freq	4.3	6.0	15.9	7.6	4.5	4.6	4.4	13.7	16.1	7.6	8.4	6.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.4	2.8	4.4	2.5	0.4	0.4	1.0	3.6	3.9	3.1	3.8	3.0	3.0
	0.51	1.07	1.78	1.22	0.56	0.59	0.70	1.73	1.75	1.17	1.35	1.04	1.20
25	0.5	3.5	5.5	3.1	0.5	0.6	1.3	4.4	4.8	3.9	4.7	3.7	3.7
	0.53	1.13	1.90	1.30	0.59	0.62	0.74	1.85	1.87	1.25	1.43	1.08	1.26
50	0.6	4.2	6.4	3.7	0.7	0.8	1.6	5.2	5.7	4.6	5.6	4.3	4.4
	0.56	1.22	2.11	1.44	0.64	0.67	0.80	2.05	2.07	1.37	1.56	1.15	1.36
100	0.7	5.0	7.7	4.4	0.9	1.0	2.1	6.2	6.8	5.6	6.6	5.1	5.3
	0.60	1.33	2.31	1.57	0.69	0.72	0.87	2.25	2.27	1.51	1.71	1.26	1.46
200	0.9	6.0	9.5	5.4	1.1	1.2	2.5	7.7	8.4	6.8	8.0	6.0	6.5
	0.58	1.28	2.22	1.51	0.66	0.70	0.84	2.15	2.17	1.44	1.64	1.22	1.42
Freq	4.4	6.8	15.4	7.2	4.6	4.6	5.2	13.9	15.3	7.7	8.3	6.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	0.5	2.6	3.4	1.8	0.6	0.6	1.5	2.9	3.0	2.5	3.0	2.1	2.4
	0.58	1.25	1.74	1.13	0.69	0.70	0.95	1.75	1.69	1.21	1.32	0.99	1.22
25	0.6	3.5	4.5	2.4	0.8	0.8	2.0	3.8	4.0	3.3	3.9	2.8	3.2
	0.59	1.32	1.84	1.19	0.73	0.74	1.00	1.85	1.79	1.27	1.38	1.02	1.28
50	0.8	4.3	5.4	2.9	1.0	1.0	2.5	4.6	4.8	4.1	4.7	3.4	3.9
	0.62	1.43	2.00	1.29	0.77	0.79	1.08	2.01	1.94	1.37	1.48	1.08	1.36
100	1.0	5.2	6.5	3.6	1.3	1.3	3.1	5.5	5.9	5.0	5.7	4.2	4.7
	0.66	1.62	2.28	1.46	0.87	0.88	1.22	2.29	2.21	1.56	1.66	1.17	1.51
200	1.2	6.3	8.0	4.3	1.5	1.5	3.8	6.8	7.2	6.1	6.9	4.9	5.7
	0.66	1.56	2.19	1.41	0.84	0.85	1.17	2.21	2.13	1.50	1.62	1.16	1.47
Freq	4.6	8.1	14.3	6.8	4.6	4.6	6.4	14.2	14.3	7.8	8.1	6.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.7	187	3.2	81	2.8	53	2.2	26
25	5.1	236	3.9	124	3.5	91	2.9	54
50	5.5	281	4.4	165	4.0	128	3.5	85
100	5.9	370	5.3	251	4.8	190	4.2	126
200	6.5	529	6.5	497	5.9	369	5.2	237

Pamplona

42° 46′ 12″ N	01° 38′ 46″ W	UTM 30	E 610769 m	N 4736248 m	454 m a.s.l.

Location in the airport of Pamplona, about 5 km S of the city, and about 600 m NW of the village of Noain.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	250	0.10	3000	0.30								
30	0.03	125	0.10	1000	0.30								
60	0.03	500	0.10										
90	0.03	500	0.10										
120	0.03	500	0.30	1250	0.10	10000	0.30					-2	
150	0.03	750	0.30	2000	0.10	7000	0.30						
180	0.03	500	0.20	2000	0.15	9000	0.30						
210	0.03	800	0.10	6000	0.30								
240	0.03	1000	0.10	2500	0.30								
270	0.03	1000	0.10	5000	0.30								
300	0.03	1000	0.10	4000	0.30								
330	0.03	2000	0.10	4500	0.30								

Height of anemometer: 6.0 m a.g.l. Period: 73080815–82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	13.6	258	12	45	75	97	118	111	99	60	101	17	5	2	0	6.1	2.03
30	4.5	811	6	44	22	37	40	8	12	3	12	2	2	0	2	0.5	0.52
60	4.0	925	12	27	21	8	4	1	1	0	2	0	0	0	0	0.7	0.78
90	4.5	805	8	56	42	25	26	16	8	1	10	1	0	3	0	0.5	0.54
120	6.2	521	10	46	57	72	65	70	61	30	60	3	2	0	2	3.5	1.14
150	7.6	449	11	64	68	69	58	60	57	40	87	23	3	8	2	4.3	1.19
180	7.9	425	21	73	112	116	87	58	44	24	29	6	1	5	1	3.9	1.34
210	4.9	670	11	47	63	61	68	44	17	6	11	1	1	1	0	1.7	0.83
240	4.8	741	6	40	37	49	30	26	24	14	25	2	2	3	0	1.1	0.65
270	4.7	740	18	45	76	29	29	24	22	4	11	1	0	0	0	0.9	0.67
300	10.6	331	10	92	137	127	87	85	59	25	37	9	0	1	0	4.4	1.60
330	26.6	138	7	45	79	111	155	149	112	69	118	13	2	1	1	6.7	2.55
Total	100.0	420	10	53	75	85	91	83	65	37	65	9	2	2	1	4.4	1.41

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	2.4	2.6	2.2	2.2	1.6	1.4	1.5	1.1	1.2	1.7	1.8	2.7	1.8
9	2.6	2.6	2.7	3.9	3.2	3.0	3.0	2.3	2.3	2.6	2.1	2.8	2.7
12	3.8	4.2	4.5	5.6	4.6	4.7	5.0	4.1	3.9	4.3	3.5	3.7	4.3
15	4.5	5.1	5.5	6.5	5.2	6.0	6.0	5.8	5.2	4.7	4.2	4.3	5.2
18	3.2	4.0	4.4	5.9	5.1	6.1	6.5	6.3	4.7	3.7	3.6	3.3	4.8
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	3.3	3.7	3.9	4.9	3.9	4.2	4.4	3.9	3.5	3.5	3.1	3.4	3.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	10.9	7.5	1.0	1.1	4.6	7.1	6.9	5.0	2.5	1.9	6.8	10.6	7.3
	2.53	1.44	0.63	0.64	1.02	1.28	1.39	1.24	0.80	0.74	1.67	2.69	1.44
25	11.8	8.2	1.1	1.2	5.0	7.8	7.6	5.4	2.7	2.1	7.5	11.6	8.0
	2.57	1.46	0.63	0.65	1.03	1.30	1.41	1.26	0.81	0.74	1.71	2.74	1.46
50	12.6	8.8	1.3	1.3	5.3	8.3	8.1	5.8	3.0	2.2	8.0	12.4	8.6
	2.63	1.49	0.65	0.67	1.05	1.32	1.44	1.29	0.83	0.76	1.76	2.82	1.48
100	13.5	9.3	1.3	1.4	5.7	8.8	8.6	6.3	3.2	2.4	8.6	13.3	9.2
	2.60	1.48	0.64	0.65	1.04	1.31	1.43	1.27	0.81	0.75	1.71	2.76	1.47
200	14.6	10.0	1.4	1.5	6.1	9.4	9.3	6.8	3.3	2.5	9.4	14.4	9.9
	2.52	1.44	0.62	0.63	1.02	1.29	1.39	1.22	0.80	0.73	1.64	2.67	1.44
Freq	18.2	7.7	4.2	4.3	5.7	7.1	7.8	6.0	4.8	4.7	8.5	21.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.7	2.8	0.5	0.8	4.0	5.1	4.8	2.5	1.5	1.2	5.1	7.8	5.1
	2.12	0.85	0.58	0.61	1.07	1.19	1.31	0.93	0.68	0.69	1.56	2.50	1.31
25	9.0	3.3	0.7	1.0	4.7	6.1	5.7	3.1	1.7	1.5	6.1	9.1	6.0
	2.20	0.87	0.62	0.63	1.10	1.22	1.37	0.98	0.69	0.72	1.66	2.62	1.35
50	10.1	3.8	0.9	1.3	5.4	6.8	6.5	3.6	2.0	1.9	7.1	10.3	6.9
	2.32	0.90	0.67	0.67	1.16	1.26	1.46	1.06	0.72	0.77	1.83	2.80	1.41
100	11.5	4.4	1.1	1.5	6.2	7.8	7.6	4.3	2.4	2.3	8.3	11.8	7.9
	2.49	0.96	0.70	0.71	1.24	1.35	1.56	1.13	0.76	0.82	1.96	3.01	1.49
200	13.4	4.9	1.3	1.8	7.1	8.8	8.9	5.2	2.7	2.7	10.1	13.9	9.3
	2.42	0.94	0.68	0.69	1.21	1.31	1.51	1.09	0.74	0.80	1.88	2.91	1.46
Freq	15.1	5.6	4.1	4.4	6.0	7.4	7.8	5.3	4.8	4.7	9.9	24.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.6	1.3	0.6	0.6	3.7	4.5	4.1	1.9	1.2	1.0	4.6	6.8	4.4
	2.06	0.65	0.69	0.56	1.12	1.19	1.32	0.87	0.67	0.69	1.60	2.53	1.30
25	8.0	1.5	0.8	0.7	4.5	5.5	5.1	2.4	1.5	1.3	5.6	8.3	5.4
	2.12	0.66	0.73	0.57	1.15	1.22	1.38	0.92	0.68	0.72	1.69	2.63	1.34
50	9.2	1.8	1.0	0.9	5.2	6.3	5.9	2.9	1.8	1.6	6.6	9.5	6.2
	2.22	0.68	0.79	0.59	1.21	1.26	1.46	0.99	0.70	0.76	1.83	2.80	1.39
100	10.6	2.1	1.3	1.1	6.1	7.2	6.9	3.5	2.1	2.0	7.8	11.0	7.3
	2.42	0.70	0.85	0.63	1.30	1.33	1.60	1.07	0.74	0.83	2.01	3.06	1.47
200	12.3	2.4	1.5	1.2	7.1	8.3	8.2	4.2	2.4	2.4	9.4	12.9	8.5
	2.35	0.70	0.82	0.62	1.27	1.33	1.55	1.04	0.73	0.80	1.94	2.97	1.45
Freq	14.0	4.9	4.1	4.5	6.1	7.6	7.9	5.1	4.8	4.7	10.4	26.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	0.4	0.7	0.6	3.0	3.5	3.2	1.3	0.9	1.3	3.9	5.4	3.5
	1.99	0.52	0.84	0.60	1.15	1.21	1.30	0.82	0.66	0.81	1.73	2.55	1.31
25	6.7	0.6	0.9	0.8	4.0	4.6	4.1	1.8	1.2	1.7	5.2	7.0	4.5
	2.05	0.52	0.88	0.61	1.18	1.23	1.35	0.86	0.67	0.85	1.81	2.63	1.34
50	7.9	0.7	1.2	1.0	4.7	5.5	5.0	2.2	1.5	2.1	6.2	8.3	5.4
	2.12	0.52	0.94	0.63	1.23	1.26	1.42	0.91	0.69	0.90	1.92	2.76	1.38
100	9.2	0.8	1.5	1.3	5.6	6.4	6.0	2.8	1.8	2.7	7.4	9.7	6.4
	2.27	0.54	1.06	0.66	1.30	1.33	1.56	1.01	0.72	1.00	2.14	3.00	1.46
200	10.8	0.9	1.8	1.5	6.6	7.5	7.1	3.3	2.1	3.2	8.9	11.5	7.6
	2.30	0.55	1.02	0.67	1.32	1.35	1.55	0.98	0.73	0.98	2.10	3.00	1.46
Freq	12.9	4.5	4.0	4.6	6.3	7.6	7.7	4.9	4.8	5.2	11.9	25.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	519	4.7	213	4.1	140	3.2	67
25	7.2	662	5.5	331	4.9	241	4.2	143
50	7.7	783	6.3	447	5.7	345	4.9	228
100	8.3	979	7.2	619	6.6	489	5.8	344
200	9.0	1277	8.4	1032	7.7	808	6.9	562

Salamanca

40° 56′ 50″ N 05° 29′ 40″ W	UTM 30 E 290027 m N 4535974 m	790 m a.s.l.

Location on a plateau, 15 km E of the city of Salamanca. The anemometer is situated near the runways of an airport and between the runways the surface is covered by grass. The nearest buildings occur to the SE at distances greater than 300 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	1600	0.10										
30	0.01	2000	0.10										
60	0.01	1500	0.10										
90	0.01	1250	0.10										
120	0.01	300	0.30	1250	0.15								
150	0.01	500	0.30	1000	0.15								
180	0.01	750	0.30	1500	0.15								
210	0.01	1500	0.10										
240	0.01	750	0.30	3500	0.20								
270	0.01	1500	0.30										
300	0.01	1100	0.30										
330	0.01	1000	0.30	3000	0.10								

Height of anemometer: 10.3 m a.g.l. Period: 72060609–82123118

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.5	508	78	137	98	65	40	27	12	15	14	4	1	0	1	2.3	1.01
30	8.3	344	77	148	131	102	63	49	31	25	22	5	1	0	1	3.4	1.33
60	12.9	232	76	147	181	117	87	68	42	21	23	4	1	0	1	4.1	1.57
90	8.4	383	101	190	128	82	50	33	16	7	9	0	2	0	1	2.8	1.30
120	4.4	642	98	115	50	31	18	16	12	9	7	1	0	0	0	1.2	0.79
150	3.6	723	74	88	54	28	16	5	8	2	2	0	0	0	0	0.8	0.71
180	5.8	504	78	127	82	73	34	36	27	13	21	3	2	0	1	2.4	1.00
210	9.9	274	42	71	71	88	78	87	63	54	101	42	13	8	6	5.7	1.55
240	12.1	241	36	88	103	93	88	88	74	58	91	26	11	2	2	5.6	1.62
270	14.7	200	44	93	106	109	103	98	81	58	75	21	9	3	0	5.6	1.76
300	9.4	305	43	86	117	116	91	78	59	43	45	15	0	1	0	4.6	1.57
330	5.1	534	55	129	105	53	40	27	15	5	27	3	3	2	2	2.3	0.94
Total	100.0	344	62	116	111	90	70	62	46	33	46	13	5	2	1	3.9	1.27

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	–	–	–	–	–	–	–	–	–	–	–	–	–
3	–	–	–	–	–	–	–	–	–	–	–	–	–
6	2.8	2.9	2.4	2.2	1.7	1.6	1.0	0.7	1.0	1.9	1.6	2.8	1.9
9	2.8	3.5	3.6	3.9	4.2	3.1	2.7	2.3	2.1	2.8	1.9	3.1	3.0
12	4.4	5.2	5.3	4.8	5.1	4.4	3.9	3.8	3.9	4.4	3.6	4.8	4.4
15	4.7	6.0	6.0	5.3	5.9	5.1	4.8	4.3	4.2	4.9	4.1	5.3	5.0
18	3.4	4.3	5.2	5.2	5.4	5.3	4.8	4.3	3.4	3.2	2.6	3.4	4.2
21	–	–	–	–	–	–	–	–	–	–	–	–	–
Day	3.7	4.4	4.5	4.3	4.5	3.9	3.4	3.1	2.9	3.5	2.8	3.9	3.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	4.6	5.6	4.8	3.2	1.7	3.2	7.1	8.3	8.3	7.4	5.1	5.9
	1.15	1.40	1.77	1.58	1.17	0.88	1.08	1.44	1.73	1.95	1.91	1.38	1.40
25	3.8	5.0	6.2	5.3	3.5	1.9	3.5	7.8	9.1	9.1	8.1	5.6	6.4
	1.18	1.45	1.83	1.62	1.21	0.90	1.11	1.46	1.76	1.99	1.97	1.42	1.43
50	4.1	5.4	6.6	5.7	3.8	2.1	3.8	8.3	9.7	9.7	8.7	6.0	6.9
	1.21	1.48	1.88	1.67	1.24	0.92	1.13	1.49	1.80	2.05	2.02	1.46	1.46
100	4.4	5.8	7.2	6.2	4.1	2.3	4.1	8.9	10.4	10.4	9.4	6.5	7.4
	1.17	1.44	1.82	1.62	1.20	0.90	1.10	1.48	1.77	2.01	1.96	1.41	1.44
200	4.8	6.4	7.9	6.8	4.5	2.4	4.5	9.6	11.2	11.4	10.4	7.1	8.1
	1.12	1.37	1.72	1.53	1.14	0.86	1.04	1.43	1.72	1.92	1.87	1.34	1.40
Freq	5.3	7.3	11.3	9.9	5.8	3.9	5.0	8.6	11.3	13.8	11.1	6.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	3.3	4.0	2.9	1.7	1.0	2.3	5.6	5.9	5.8	4.9	2.7	4.0
	1.00	1.24	1.55	1.23	0.87	0.75	0.97	1.41	1.56	1.73	1.57	1.00	1.24
25	2.8	4.0	4.8	3.6	2.1	1.3	2.9	6.6	7.0	6.9	5.9	3.3	4.8
	1.07	1.33	1.67	1.33	0.94	0.80	1.04	1.46	1.63	1.83	1.69	1.07	1.31
50	3.3	4.7	5.6	4.2	2.5	1.6	3.5	7.4	7.9	7.9	6.8	3.9	5.6
	1.19	1.49	1.88	1.49	1.04	0.88	1.15	1.54	1.74	2.00	1.90	1.20	1.41
100	4.0	5.6	6.6	5.0	3.1	1.9	4.2	8.5	9.1	9.2	8.1	4.7	6.6
	1.26	1.59	2.00	1.58	1.10	0.94	1.23	1.66	1.86	2.14	2.02	1.27	1.51
200	4.9	6.9	8.2	6.2	3.8	2.3	5.2	9.9	10.7	11.1	10.1	5.8	8.0
	1.21	1.52	1.91	1.51	1.05	0.90	1.17	1.61	1.80	2.06	1.93	1.22	1.48
Freq	5.5	8.0	12.4	8.8	4.8	3.7	5.6	9.6	11.8	14.5	9.9	5.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	2.9	3.5	2.5	1.2	0.8	2.1	5.0	5.1	5.0	4.2	2.1	3.5
	0.99	1.27	1.56	1.21	0.79	0.72	0.99	1.46	1.58	1.75	1.56	0.95	1.25
25	2.5	3.7	4.3	3.1	1.6	1.0	2.7	6.1	6.3	6.2	5.2	2.6	4.3
	1.06	1.35	1.66	1.28	0.84	0.76	1.06	1.50	1.64	1.85	1.67	1.01	1.30
50	3.0	4.3	5.1	3.7	1.9	1.2	3.3	7.0	7.3	7.2	6.1	3.2	5.1
	1.16	1.49	1.84	1.42	0.92	0.82	1.16	1.58	1.73	2.00	1.84	1.10	1.39
100	3.6	5.2	6.1	4.4	2.4	1.5	4.0	8.1	8.4	8.4	7.3	3.9	6.1
	1.27	1.64	2.02	1.55	0.99	0.89	1.27	1.72	1.90	2.20	2.03	1.21	1.51
200	4.4	6.4	7.5	5.4	2.9	1.9	4.9	9.4	9.9	10.2	9.0	4.8	7.3
	1.22	1.57	1.93	1.49	0.96	0.86	1.22	1.67	1.84	2.12	1.94	1.16	1.48
Freq	5.5	8.3	12.9	8.4	4.4	3.6	5.8	9.9	12.0	14.7	9.4	5.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	2.4	2.7	1.8	0.9	0.8	2.0	4.0	4.0	3.9	3.2	1.5	2.8
	1.02	1.33	1.56	1.14	0.79	0.76	1.01	1.48	1.60	1.75	1.51	0.92	1.25
25	2.2	3.2	3.6	2.4	1.3	1.1	2.7	5.2	5.3	5.1	4.2	2.1	3.6
	1.08	1.40	1.65	1.20	0.83	0.80	1.06	1.52	1.65	1.83	1.59	0.97	1.30
50	2.7	3.9	4.3	3.0	1.6	1.4	3.3	6.1	6.3	6.2	5.1	2.6	4.4
	1.17	1.52	1.79	1.30	0.88	0.86	1.13	1.59	1.74	1.96	1.73	1.04	1.37
100	3.4	4.7	5.3	3.7	2.0	1.7	4.0	7.3	7.4	7.4	6.2	3.3	5.3
	1.32	1.73	2.04	1.47	0.99	0.96	1.27	1.71	1.89	2.20	1.97	1.18	1.50
200	4.1	5.8	6.4	4.5	2.5	2.1	4.9	8.5	8.8	8.9	7.5	3.9	6.4
	1.27	1.67	1.96	1.42	0.96	0.93	1.24	1.72	1.89	2.14	1.90	1.14	1.49
Freq	5.8	8.9	12.4	7.8	4.3	3.9	6.3	10.1	12.4	14.1	8.9	5.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.3	279	3.7	120	3.3	78	2.6	37
25	5.8	353	4.5	183	4.0	134	3.4	79
50	6.2	420	5.1	243	4.7	189	4.0	125
100	6.7	539	6.0	353	5.5	273	4.8	186
200	7.4	744	7.3	652	6.6	496	5.8	329

Santiago de Compostela

42° 56′ 00″ N	08° 26′ 00″ W	UTM 29	E 546240 m	N 4753653 m	364 m a.s.l.

The station was situated near the runways of the airport of Santiago de Compostela. There are some buildings from S to W at distances greater than 150 m. The surroundings of the airport are characterized by many closely spaced houses and trees.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	750	0.30									2	-2
30	0.01	500	0.30									-3	-3
60	0.01	500	0.30									-7	-1
90	0.01	750	0.30									-5	2
120	0.01	750	0.30									1	3
150	0.01	2000	0.30									4	1
180	0.01	1500	0.05	2000	0.30							2	-2
210	0.01	300	0.05	2500	0.30							-3	-3
240	0.01	350	0.15	1000	0.30							-7	-1
270	0.01	250	0.30									-5	3
300	0.01	400	0.30									1	3
330	0.01	600	0.30									4	1

Height of anemometer: 6.0 m a.g.l. Period: 72060612-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.7	214	66	136	119	167	146	80	43	14	14	0	0	1	0	4.4	2.02
30	13.9	154	50	96	117	181	156	115	73	27	30	1	0	0	0	5.2	2.40
60	9.7	202	54	114	131	151	128	94	65	27	32	0	0	0	0	4.8	2.02
90	6.9	291	81	179	157	134	78	37	31	5	7	0	0	0	0	3.4	1.65
120	7.2	247	98	235	169	138	76	24	7	3	2	0	0	0	0	3.2	1.83
150	5.8	343	73	147	130	123	86	46	30	7	12	2	1	0	0	3.4	1.47
180	6.3	284	61	128	111	134	103	59	55	23	37	3	1	1	0	4.2	1.56
210	9.3	225	29	99	102	126	125	111	97	26	48	7	1	2	2	5.3	1.89
240	12.4	151	36	83	105	140	146	123	90	40	69	8	5	2	0	5.8	2.14
270	8.4	241	63	141	118	138	123	88	39	17	32	1	0	0	0	4.3	1.77
300	5.6	338	70	184	113	125	71	46	36	9	8	0	0	0	0	3.2	1.45
330	4.7	410	89	149	99	97	82	36	21	8	8	1	0	1	0	2.8	1.27
Total	100.0	235	60	132	121	143	118	81	55	20	29	2	1	1	0	4.5	1.77

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.3	3.7	3.1	2.8	2.7	2.5	2.2	1.8	2.3	2.7	2.2	3.5	2.7
3	3.5	3.7	3.0	2.9	2.4	2.6	2.1	1.5	2.0	2.8	2.5	3.6	2.7
6	3.5	3.7	3.0	2.8	2.4	2.5	2.0	1.9	2.1	2.8	2.6	3.7	2.7
9	3.4	3.8	3.8	4.2	3.8	3.8	3.4	2.9	3.1	3.4	2.8	3.7	3.5
12	4.2	4.7	5.3	5.0	4.6	4.5	4.2	4.0	3.7	4.4	4.0	4.5	4.4
15	4.5	5.3	5.4	5.7	5.3	5.4	4.9	4.8	4.6	4.5	4.0	4.7	4.9
18	3.4	4.3	4.9	5.4	5.1	5.0	5.0	4.6	3.8	3.3	2.6	3.8	4.3
21	3.2	3.5	2.9	3.4	3.0	3.3	2.7	2.1	2.2	2.6	2.4	3.8	2.9
Day	3.6	4.1	4.0	4.1	3.7	3.8	3.4	3.1	3.1	3.4	2.9	3.9	3.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	8.6	8.9	7.3	5.6	5.3	6.1	8.3	10.0	9.3	6.8	5.2	7.8
	2.17	2.69	2.58	2.08	2.07	1.94	1.80	2.02	2.27	2.20	1.84	1.62	1.98
25	7.3	9.4	9.7	8.0	6.2	5.8	6.7	9.1	10.9	10.1	7.5	5.7	8.5
	2.23	2.78	2.66	2.15	2.14	2.01	1.86	2.07	2.31	2.24	1.90	1.67	2.03
50	7.9	10.1	10.4	8.6	6.6	6.3	7.2	9.7	11.7	10.8	8.0	6.1	9.1
	2.29	2.85	2.73	2.21	2.19	2.06	1.91	2.13	2.37	2.30	1.95	1.72	2.08
100	8.6	11.0	11.3	9.3	7.2	6.8	7.8	10.5	12.5	11.6	8.7	6.6	9.9
	2.22	2.76	2.65	2.14	2.12	1.99	1.85	2.08	2.33	2.26	1.89	1.66	2.04
200	9.5	12.2	12.5	10.3	7.9	7.5	8.6	11.4	13.5	12.6	9.6	7.3	10.8
	2.10	2.61	2.52	2.03	2.01	1.89	1.75	1.99	2.26	2.17	1.79	1.58	1.97
Freq	7.1	11.9	12.0	8.7	7.1	6.0	5.7	7.9	11.7	10.4	6.7	4.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	6.3	6.2	4.6	3.8	3.7	4.4	6.1	7.3	6.1	4.3	3.3	5.4
	1.95	2.36	2.11	1.68	1.79	1.54	1.55	1.83	2.08	1.83	1.50	1.31	1.73
25	5.9	7.5	7.4	5.5	4.6	4.4	5.3	7.2	8.6	7.2	5.2	4.1	6.5
	2.10	2.55	2.26	1.81	1.94	1.67	1.68	1.93	2.17	1.94	1.62	1.41	1.83
50	6.8	8.6	8.5	6.3	5.3	5.1	6.2	8.3	9.7	8.2	6.0	4.8	7.5
	2.37	2.87	2.51	2.04	2.18	1.87	1.88	2.10	2.30	2.11	1.81	1.58	2.00
100	8.0	10.2	10.0	7.6	6.3	6.1	7.4	9.6	11.1	9.6	7.2	5.7	8.8
	2.52	3.05	2.69	2.17	2.32	1.99	2.00	2.25	2.47	2.27	1.93	1.69	2.14
200	10.0	12.7	12.3	9.4	7.9	7.6	9.2	11.5	13.0	11.5	8.9	7.1	10.7
	2.40	2.91	2.57	2.07	2.21	1.90	1.91	2.17	2.40	2.18	1.84	1.61	2.10
Freq	8.2	13.1	11.2	7.9	7.0	5.6	5.8	8.7	12.6	9.3	6.0	4.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	5.5	5.3	3.8	3.3	3.2	3.9	5.4	6.4	5.1	3.5	2.9	4.7
	1.99	2.33	2.06	1.67	1.81	1.52	1.56	1.85	2.11	1.78	1.46	1.30	1.72
25	5.3	6.8	6.6	4.7	4.1	3.9	4.9	6.6	7.8	6.2	4.4	3.6	5.8
	2.13	2.49	2.19	1.78	1.93	1.63	1.67	1.94	2.19	1.88	1.55	1.39	1.81
50	6.3	7.9	7.7	5.5	4.8	4.7	5.8	7.6	9.0	7.3	5.2	4.3	6.8
	2.36	2.76	2.39	1.97	2.14	1.80	1.84	2.08	2.30	2.04	1.72	1.53	1.95
100	7.4	9.4	9.0	6.6	5.7	5.6	6.9	8.9	10.4	8.5	6.2	5.1	8.0
	2.59	3.03	2.63	2.17	2.35	1.98	2.02	2.28	2.52	2.24	1.88	1.68	2.13
200	9.2	11.6	11.0	8.2	7.1	6.8	8.5	10.7	12.1	10.3	7.7	6.3	9.7
	2.48	2.90	2.53	2.07	2.25	1.89	1.94	2.20	2.44	2.15	1.80	1.61	2.09
Freq	8.7	13.5	11.0	7.6	7.0	5.5	5.9	9.0	12.9	9.0	5.7	4.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	4.3	4.1	2.9	2.6	2.5	3.2	4.3	5.1	3.8	2.7	2.4	3.7
	2.05	2.32	2.00	1.71	1.83	1.51	1.60	1.88	2.12	1.74	1.49	1.35	1.73
25	4.6	5.7	5.4	3.8	3.4	3.3	4.3	5.6	6.6	5.0	3.6	3.1	4.9
	2.17	2.46	2.10	1.81	1.94	1.59	1.70	1.95	2.18	1.82	1.58	1.42	1.81
50	5.6	6.8	6.5	4.6	4.2	4.1	5.2	6.7	7.8	6.0	4.3	3.8	5.9
	2.36	2.67	2.26	1.96	2.11	1.73	1.84	2.07	2.28	1.96	1.72	1.54	1.92
100	6.7	8.2	7.8	5.5	5.0	4.9	6.3	8.0	9.2	7.2	5.3	4.7	7.0
	2.69	3.05	2.57	2.24	2.40	1.97	2.10	2.28	2.46	2.20	1.96	1.75	2.13
200	8.2	10.0	9.4	6.8	6.1	6.0	7.6	9.5	10.8	8.7	6.4	5.7	8.5
	2.59	2.94	2.48	2.15	2.31	1.90	2.02	2.26	2.47	2.14	1.88	1.69	2.11
Freq	9.1	13.7	10.7	7.4	6.9	5.3	6.0	9.4	13.0	8.6	5.3	4.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.9	387	4.8	155	4.2	102	3.3	49
25	7.5	496	5.8	244	5.2	178	4.3	105
50	8.1	595	6.6	338	6.0	260	5.2	171
100	8.7	764	7.8	512	7.1	393	6.2	267
200	9.6	1048	9.5	951	8.6	717	7.5	474

Sevilla

37° 25′ 00″ N 05° 54′ 00″ W	UTM 30 E 243343 m N 4145112 m	27 m a.s.l.

Located in the Guadalquivir Valley, E of the city of Sevilla. The anemometer is located in an airport and the surface consists of runways and grass. The nearest buildings appear to the E at distances greater than 300 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	900	0.30	3500	0.15								
30	0.03	700	0.10	1500	0.30								
60	0.03	700	0.30										
90	0.03	1000	0.30										
120	0.03	1250	0.30										
150	0.03	1000	0.10	2000	0.30								
180	0.03	1000	0.10	2000	0.30								
210	0.03	1500	0.30										
240	0.03	1500	0.30										
270	0.03	2500	0.30										
300	0.03	2250	0.20									-1	
330	0.03	500	0.30	1500	0.10	3500	0.30					-2	

Height of anemometer: 5.5 m a.g.l. Period: 72060903-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.1	587	59	148	100	42	32	14	8	2	4	0	0	3	0	1.7	0.94
30	10.3	305	92	245	183	103	44	13	8	4	2	0	0	1	0	3.0	1.70
60	12.4	237	61	148	167	131	96	84	42	18	15	3	0	0	0	4.1	1.76
90	6.4	457	45	96	96	83	64	65	50	18	23	2	0	0	1	3.2	1.19
120	3.8	742	48	77	43	38	19	17	9	3	3	0	0	1	0	0.8	0.66
150	4.2	721	57	102	49	29	8	13	7	6	4	3	0	1	0	0.9	0.67
180	8.2	385	105	220	120	58	34	37	16	8	11	3	1	1	0	2.7	1.22
210	14.2	222	60	164	164	119	79	61	54	22	42	9	2	2	1	4.2	1.44
240	15.5	190	46	139	148	153	106	89	64	30	30	4	0	0	0	4.7	1.89
270	8.8	324	52	143	149	114	84	62	36	18	15	2	0	0	0	3.7	1.55
300	6.0	486	58	131	121	74	48	33	22	13	10	3	1	0	0	2.6	1.14
330	5.0	586	69	145	78	43	23	22	18	8	6	0	1	0	0	1.7	0.94
Total	100.0	358	63	155	135	99	65	52	35	15	18	3	0	1	0	3.3	1.34

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	1.6	1.9	1.7	1.7	2.3	2.5	2.7	2.4	1.9	1.6	1.6	2.2	2.0
3	1.8	2.0	1.5	1.4	1.6	1.6	1.6	1.3	1.0	1.5	1.6	2.2	1.6
6	2.0	2.2	1.6	1.4	1.3	1.0	0.8	0.9	1.0	1.7	1.8	2.5	1.5
9	2.5	2.8	2.6	2.6	2.9	2.4	2.2	2.1	2.0	2.7	2.9	2.8	2.6
12	3.4	4.1	3.7	3.7	3.8	3.5	3.3	2.6	3.1	3.3	3.6	3.7	3.5
15	3.5	4.2	3.9	4.3	4.6	4.6	4.3	3.7	3.7	3.5	3.5	3.6	3.9
18	2.2	3.2	3.8	4.4	5.3	5.6	5.4	4.9	4.4	3.3	2.3	2.6	3.9
21	1.9	2.3	2.4	2.5	3.4	4.1	4.0	3.7	3.0	2.2	1.6	2.4	2.8
Day	2.4	2.8	2.7	2.8	3.1	3.2	3.0	2.7	2.5	2.5	2.4	2.7	2.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	5.1	6.8	6.9	3.7	1.7	4.4	6.8	8.0	7.4	5.6	4.0	6.0
	1.13	1.81	1.96	1.78	1.05	0.78	1.31	1.54	2.01	2.06	1.60	1.23	1.53
25	3.8	5.6	7.5	7.6	4.0	1.9	4.8	7.5	8.8	8.1	6.1	4.4	6.6
	1.17	1.87	2.02	1.83	1.08	0.80	1.35	1.57	2.06	2.12	1.65	1.26	1.57
50	4.1	6.0	8.1	8.1	4.4	2.1	5.2	8.0	9.4	8.7	6.6	4.7	7.1
	1.19	1.91	2.07	1.88	1.10	0.82	1.38	1.61	2.12	2.18	1.69	1.29	1.60
100	4.4	6.5	8.7	8.8	4.7	2.2	5.6	8.6	10.2	9.4	7.1	5.1	7.6
	1.16	1.85	2.01	1.83	1.08	0.80	1.34	1.58	2.06	2.11	1.64	1.26	1.57
200	4.8	7.2	9.6	9.7	5.0	2.4	6.2	9.3	11.1	10.4	7.8	5.6	8.4
	1.10	1.76	1.90	1.74	1.03	0.76	1.27	1.52	1.97	2.00	1.56	1.19	1.51
Freq	5.1	8.2	11.7	8.7	4.8	4.0	6.6	12.0	15.1	11.4	7.1	5.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	3.7	5.1	4.4	1.6	1.3	3.2	5.1	5.7	4.8	3.4	2.4	4.1
	0.95	1.66	1.72	1.34	0.77	0.74	1.18	1.42	1.84	1.63	1.24	0.98	1.33
25	2.7	4.5	6.1	5.3	2.0	1.6	3.9	6.0	6.8	5.7	4.1	2.9	5.0
	1.02	1.79	1.86	1.43	0.81	0.79	1.27	1.49	1.97	1.76	1.33	1.04	1.41
50	3.2	5.2	7.1	6.1	2.4	2.0	4.6	6.9	7.9	6.6	4.9	3.5	5.8
	1.13	2.01	2.09	1.57	0.89	0.87	1.42	1.61	2.18	1.98	1.49	1.16	1.54
100	3.9	6.2	8.4	7.2	2.9	2.5	5.5	8.0	9.2	7.9	5.8	4.2	6.8
	1.20	2.14	2.22	1.68	0.94	0.92	1.51	1.73	2.33	2.11	1.58	1.23	1.63
200	4.8	7.7	10.4	8.8	3.5	3.0	6.8	9.5	11.3	9.8	7.2	5.2	8.4
	1.15	2.04	2.12	1.62	0.91	0.89	1.44	1.67	2.23	2.01	1.51	1.18	1.58
Freq	5.1	9.5	12.1	7.3	4.2	4.1	7.6	13.4	15.4	9.8	6.4	5.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	3.2	4.5	3.6	1.2	1.0	2.9	4.5	5.0	4.0	2.8	2.0	3.6
	0.97	1.65	1.75	1.27	0.74	0.72	1.20	1.44	1.88	1.60	1.19	0.97	1.33
25	2.5	4.0	5.6	4.5	1.5	1.4	3.6	5.5	6.2	4.9	3.5	2.6	4.4
	1.03	1.76	1.87	1.34	0.78	0.76	1.28	1.50	2.00	1.71	1.26	1.03	1.40
50	3.0	4.7	6.6	5.3	1.9	1.7	4.3	6.4	7.2	5.8	4.2	3.1	5.2
	1.13	1.95	2.07	1.44	0.85	0.82	1.41	1.60	2.19	1.88	1.39	1.13	1.51
100	3.6	5.7	7.8	6.3	2.3	2.1	5.2	7.5	8.6	7.0	5.1	3.8	6.3
	1.23	2.14	2.28	1.58	0.92	0.89	1.54	1.75	2.40	2.07	1.52	1.24	1.63
200	4.4	7.0	9.7	7.6	2.8	2.6	6.3	8.9	10.4	8.6	6.3	4.7	7.6
	1.18	2.05	2.18	1.52	0.89	0.86	1.48	1.69	2.31	1.98	1.46	1.19	1.58
Freq	5.1	10.0	12.3	6.8	4.0	4.2	7.9	13.9	15.4	9.2	6.2	5.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.6	2.7	3.6	2.7	0.7	0.9	2.4	3.6	3.9	3.0	2.1	1.5	2.8
	1.01	1.70	1.77	1.19	0.68	0.75	1.25	1.50	1.90	1.56	1.15	0.94	1.33
25	2.2	3.5	4.7	3.5	1.0	1.3	3.3	4.8	5.2	4.0	2.8	2.0	3.7
	1.07	1.80	1.87	1.24	0.71	0.79	1.32	1.56	2.00	1.65	1.22	0.99	1.39
50	2.7	4.3	5.7	4.3	1.2	1.6	4.0	5.7	6.2	4.8	3.5	2.5	4.5
	1.15	1.96	2.04	1.32	0.76	0.84	1.43	1.64	2.16	1.79	1.31	1.06	1.48
100	3.3	5.2	6.9	5.2	1.6	2.1	4.9	6.8	7.5	5.9	4.3	3.2	5.5
	1.30	2.23	2.32	1.47	0.84	0.94	1.63	1.81	2.45	2.04	1.49	1.20	1.63
200	4.0	6.3	8.4	6.2	1.9	2.5	5.9	8.1	9.1	7.2	5.2	3.8	6.6
	1.26	2.15	2.24	1.44	0.82	0.91	1.57	1.79	2.37	1.96	1.44	1.16	1.60
Freq	5.4	10.4	12.1	6.3	3.8	4.5	8.6	14.3	15.1	8.6	5.9	5.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.4	256	3.8	109	3.3	72	2.6	34
25	5.9	324	4.5	167	4.0	123	3.4	72
50	6.4	388	5.2	224	4.7	174	4.1	115
100	6.9	506	6.1	338	5.6	259	4.9	174
200	7.6	714	7.5	655	6.8	492	6.0	319

Tenerife (Los Rodeos)

28° 28′ 10″ N 16° 19′ 04″ W	UTM 28 E 370986 m N 3149959 m	605 m a.s.l.

Located in an airport on the island of Tenerife (Islas Canarias), approx. 35 km NE of the mountain Pico de Teide (3715 m). The terrain slopes down to the sea in all sectors except SW. Scattered houses and trees appear outside the airport.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	100	0.30	11000	0.00								
30	0.03	100	0.30	11000	0.00								
60	0.03	300	0.30	20000	0.00								
90	0.03	400	0.30	8000	0.00								
120	0.03	250	0.30	6000	0.00								
150	0.03	250	0.30	6500	0.00								
180	0.03	250	0.30	8500	0.00								
210	0.03	500	0.30										
240	0.01	400	0.30										
270	0.01	1000	0.10	3500	0.30	11000	0.00						
300	0.03	2500	0.30	9500	0.00								
330	0.03	250	0.30	8500	0.00								

Height of anemometer: 5.0 m a.g.l. Period: 72060609–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	17.4	49	9	74	119	150	102	98	121	68	139	53	15	3	0	7.1	2.21
30	42.5	20	4	37	81	110	95	117	152	93	193	74	20	3	1	8.2	2.84
60	11.3	75	13	39	77	111	100	135	156	88	143	52	8	2	0	7.5	2.76
90	6.1	112	7	47	77	109	115	147	200	84	95	5	2	0	0	6.8	3.21
120	3.3	268	14	77	184	152	82	82	74	21	38	7	0	1	0	4.6	1.74
150	2.3	373	21	126	147	129	44	36	43	21	33	21	7	0	0	3.8	1.28
180	2.4	299	35	122	196	122	57	45	31	16	69	6	1	0	0	4.1	1.43
210	2.5	336	15	76	139	126	97	70	53	26	39	22	0	0	0	4.5	1.57
240	2.2	350	19	59	91	103	95	91	86	30	53	16	7	0	0	4.8	1.60
270	2.3	364	15	74	117	68	76	57	73	34	91	26	4	2	0	4.6	1.32
300	3.0	271	24	123	137	111	67	87	70	41	57	10	1	0	0	4.6	1.53
330	4.7	207	13	92	144	129	93	98	102	58	49	8	3	2	0	5.3	1.85
Total	100.0	99	9	57	102	119	94	108	131	74	140	50	13	2	0	7.2	2.35

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.5	4.4	6.6	5.8	5.8	5.7	6.3	7.9	6.2	5.4	3.5	4.3	5.6
3	-	-	7.2	4.7	5.0	5.2	6.6	6.2	6.2	4.6	-	-	5.8
6	4.3	4.3	5.1	4.5	5.4	4.7	6.2	5.9	4.4	3.7	4.0	4.3	4.8
9	4.4	4.7	6.2	6.2	7.5	6.7	7.7	7.1	6.1	5.0	4.6	4.3	5.9
12	6.1	6.9	7.8	7.3	8.0	7.4	8.2	7.5	7.2	6.6	6.3	6.1	7.1
15	6.6	7.1	8.0	7.7	8.4	7.7	8.5	8.1	7.6	6.7	6.2	6.2	7.4
18	5.8	6.9	7.8	7.6	8.4	7.7	8.8	8.1	7.6	6.6	5.9	5.3	7.2
21	4.6	4.8	6.1	6.0	7.0	6.2	7.5	6.7	5.7	4.8	4.3	3.9	5.6
Day	5.3	5.8	6.9	6.5	7.4	6.7	7.8	7.3	6.5	5.6	5.3	5.0	6.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	13.3	15.6	14.8	12.0	8.8	6.7	6.7	8.2	8.6	7.0	7.0	8.7	13.1
	2.13	2.74	2.83	2.87	1.94	1.38	1.38	1.73	1.78	1.37	1.49	1.78	2.14
25	14.5	16.9	16.1	13.0	9.6	7.4	7.4	8.9	9.3	7.7	7.7	9.5	14.3
	2.15	2.75	2.85	2.90	1.98	1.41	1.41	1.75	1.81	1.40	1.52	1.82	2.16
50	15.4	18.0	17.1	13.9	10.2	7.9	7.9	9.6	10.0	8.2	8.3	10.2	15.2
	2.17	2.78	2.88	2.97	2.03	1.45	1.45	1.80	1.85	1.44	1.56	1.87	2.19
100	16.3	19.0	18.2	14.9	11.0	8.5	8.5	10.2	10.7	8.8	8.9	10.9	16.2
	2.18	2.79	2.89	2.94	1.99	1.42	1.42	1.77	1.83	1.41	1.53	1.83	2.19
200	17.4	20.3	19.4	16.0	11.9	9.1	9.1	11.1	11.5	9.4	9.6	11.8	17.3
	2.15	2.76	2.85	2.86	1.91	1.37	1.37	1.71	1.77	1.37	1.48	1.77	2.17
Freq	14.6	37.2	17.9	7.2	3.9	2.5	2.4	2.5	2.3	2.3	2.8	4.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.7	11.3	9.9	7.9	5.2	4.3	4.7	5.9	6.0	4.7	4.9	6.3	9.4
	2.05	2.63	2.72	2.78	1.49	1.13	1.24	1.57	1.60	1.20	1.33	1.62	2.01
25	11.3	13.1	11.6	9.3	6.3	5.2	5.6	7.0	7.1	5.5	5.8	7.4	10.9
	2.09	2.67	2.78	2.91	1.58	1.18	1.31	1.64	1.66	1.25	1.41	1.70	2.05
50	12.6	14.6	12.9	10.5	7.2	5.9	6.5	7.9	8.1	6.3	6.8	8.4	12.2
	2.14	2.74	2.88	3.13	1.74	1.26	1.41	1.75	1.77	1.33	1.54	1.81	2.12
100	14.0	16.2	14.4	12.1	8.5	6.9	7.5	9.1	9.3	7.4	7.9	9.7	13.7
	2.25	2.85	3.07	3.36	1.86	1.35	1.51	1.88	1.90	1.43	1.65	1.94	2.23
200	15.7	18.0	16.4	14.3	10.3	8.1	8.9	10.7	10.9	8.6	9.5	11.4	15.5
	2.23	2.85	3.00	3.24	1.79	1.31	1.46	1.82	1.84	1.38	1.58	1.88	2.25
Freq	17.4	42.5	11.4	6.1	3.3	2.3	2.4	2.5	2.2	2.3	3.0	4.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.7	9.8	8.6	6.8	4.5	3.8	4.1	5.2	5.2	4.1	4.3	6.1	8.1
	2.15	2.62	2.73	2.65	1.47	1.14	1.24	1.58	1.57	1.21	1.36	1.65	2.01
25	10.4	11.8	10.4	8.3	5.6	4.7	5.1	6.3	6.3	5.0	5.4	7.4	9.8
	2.19	2.65	2.78	2.77	1.55	1.18	1.30	1.65	1.63	1.25	1.42	1.70	2.05
50	11.9	13.3	11.8	9.5	6.5	5.4	5.9	7.3	7.3	5.8	6.3	8.5	11.2
	2.24	2.70	2.87	2.95	1.68	1.25	1.38	1.74	1.72	1.33	1.53	1.77	2.11
100	13.4	15.0	13.3	11.0	7.7	6.4	7.0	8.4	8.4	6.8	7.4	9.8	12.7
	2.33	2.81	3.04	3.22	1.84	1.37	1.51	1.90	1.88	1.45	1.67	1.91	2.21
200	15.1	16.8	15.2	13.0	9.3	7.5	8.2	9.9	9.9	8.0	8.9	11.3	14.4
	2.35	2.84	3.03	3.12	1.77	1.33	1.46	1.85	1.82	1.40	1.62	1.88	2.24
Freq	19.2	40.3	10.9	5.9	3.2	2.3	2.4	2.5	2.2	2.4	3.1	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.9	7.6	6.6	5.2	3.5	3.0	3.3	4.1	4.0	3.2	3.6	5.3	6.3
	2.25	2.60	2.71	2.51	1.44	1.15	1.27	1.59	1.54	1.22	1.41	1.72	2.01
25	9.0	9.8	8.6	6.8	4.6	4.0	4.3	5.3	5.2	4.2	4.7	6.8	8.2
	2.28	2.63	2.76	2.61	1.51	1.19	1.32	1.65	1.59	1.26	1.47	1.76	2.04
50	10.5	11.5	10.1	8.1	5.6	4.8	5.2	6.3	6.2	5.0	5.7	8.1	9.7
	2.32	2.68	2.84	2.74	1.62	1.26	1.39	1.73	1.67	1.33	1.56	1.80	2.09
100	12.2	13.3	11.7	9.5	6.7	5.7	6.3	7.5	7.3	6.0	6.8	9.4	11.2
	2.40	2.76	2.97	3.00	1.81	1.37	1.52	1.87	1.80	1.45	1.72	1.89	2.18
200	14.0	15.2	13.6	11.3	8.1	6.8	7.4	8.8	8.6	7.2	8.1	10.9	13.0
	2.46	2.83	3.04	2.99	1.77	1.36	1.51	1.87	1.81	1.44	1.70	1.93	2.24
Freq	21.8	37.0	10.4	5.6	3.1	2.3	2.4	2.5	2.3	2.4	3.3	6.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	11.6	1727	8.3	664	7.2	432	5.6	206
25	12.7	2207	9.7	1036	8.7	751	7.3	439
50	13.5	2626	10.8	1403	9.9	1077	8.6	704
100	14.3	3157	12.1	1883	11.2	1504	10.0	1063
200	15.3	3873	13.7	2705	12.8	2193	11.5	1596

Tenerife (Reina Sofía)

28° 02′ 00″ N	16° 34′ 00″ W	UTM 28	E 345991 m	N 3101928 m	72 m a.s.l.

Located 2 km N of the S coast of the island of Tenerife. The island slopes from the sea to the summit of Pico de Teide (3715 m), 25 km to the N.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.10	2500	0.30								
30	0.03	500	0.10	3500	0.30								
60	0.03	500	0.10	6000	0.00								
90	0.03	500	0.10	2500	0.00								
120	0.03	500	0.10	1600	0.00								
150	0.03	500	0.10	2500	0.00								
180	0.03	500	0.10	1800	0.00								
210	0.03	500	0.10	2200	0.00								
240	0.03	500	0.10	4000	0.01								
270	0.01	1200	0.10										
300	0.01	750	0.10										
330	0.01	250	0.10										

Height of anemometer: 6.0 m a.g.l. Period: 78120112–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.0	209	55	255	228	139	82	14	7	3	7	1	0	0	0	3.5	2.00
30	30.2	42	9	57	115	152	140	109	108	63	147	43	11	2	1	7.0	2.16
60	26.9	39	5	22	51	84	97	93	123	85	257	112	23	8	0	8.9	3.04
90	8.2	146	9	66	118	140	173	117	84	52	85	8	0	0	0	6.0	2.36
120	3.2	432	33	90	180	126	102	17	14	2	3	0	0	0	0	3.1	1.61
150	3.2	399	16	159	166	151	86	12	9	0	3	0	0	0	0	3.1	1.74
180	3.7	342	16	74	153	180	164	43	13	7	5	2	0	0	0	4.0	2.09
210	3.8	381	8	77	119	118	95	75	56	26	43	3	0	0	0	4.2	1.56
240	4.1	355	10	57	76	62	90	52	110	47	73	38	10	19	2	5.5	1.44
270	3.8	334	29	104	105	101	85	50	62	25	70	31	4	0	0	4.5	1.36
300	2.3	501	55	158	165	72	29	11	4	0	5	0	0	0	0	2.3	1.34
330	3.6	349	65	215	237	98	31	3	3	0	0	0	0	0	0	2.8	2.03
Total	100.0	155	16	78	115	121	113	78	84	51	128	47	10	4	0	6.3	1.81

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.2	3.9	4.4	3.5	4.3	4.3	4.4	4.5	3.4	3.3	3.4	4.9	4.0
3	3.7	4.0	3.3	2.9	3.5	3.0	3.7	4.2	3.0	3.2	3.7	4.3	3.6
6	4.2	4.0	4.4	3.2	3.8	2.5	3.3	3.1	2.7	3.0	3.8	4.6	3.5
9	4.7	4.0	5.0	3.6	4.8	4.0	4.8	4.9	3.7	3.1	4.3	4.5	4.3
12	6.9	7.2	7.9	6.4	8.1	8.0	8.6	8.3	7.1	7.0	7.0	6.8	7.4
15	7.5	7.7	8.3	7.3	8.3	8.4	9.3	9.2	7.9	7.0	7.2	7.2	7.9
18	6.8	6.6	7.6	6.8	8.0	7.7	8.2	8.2	7.1	6.2	5.9	6.4	7.1
21	4.6	4.6	4.9	4.8	5.6	5.3	6.6	5.7	5.1	3.9	3.9	4.5	4.9
Day	5.4	5.3	5.9	5.0	5.9	5.5	6.2	6.0	5.1	4.6	4.9	5.5	5.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	11.8	12.8	9.9	5.7	4.3	5.3	5.8	8.3	7.3	4.6	4.7	9.8
	2.40	2.27	2.83	2.10	1.69	1.71	2.01	1.62	1.54	1.52	1.43	2.33	1.84
25	6.3	12.8	13.9	10.8	6.2	4.7	5.8	6.3	9.1	7.9	5.0	5.1	10.7
	2.48	2.30	2.86	2.13	1.74	1.77	2.07	1.67	1.56	1.55	1.48	2.40	1.86
50	6.8	13.6	14.8	11.5	6.7	5.1	6.2	6.8	9.7	8.5	5.4	5.5	11.4
	2.55	2.33	2.92	2.19	1.79	1.81	2.12	1.72	1.58	1.60	1.51	2.47	1.89
100	7.4	14.5	15.8	12.4	7.3	5.5	6.7	7.4	10.3	9.1	5.9	5.9	12.2
	2.46	2.33	2.90	2.15	1.73	1.76	2.06	1.66	1.57	1.56	1.47	2.39	1.89
200	8.2	15.6	16.9	13.4	8.0	6.1	7.4	8.1	11.1	9.8	6.4	6.6	13.1
	2.33	2.28	2.83	2.08	1.64	1.66	1.95	1.58	1.54	1.52	1.39	2.26	1.87
Freq	6.4	26.1	27.7	11.3	4.1	3.2	3.6	3.8	4.1	3.9	2.6	3.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	8.6	9.2	5.7	2.8	3.0	3.8	4.0	6.1	4.8	2.6	3.3	6.9
	1.55	2.20	2.77	1.94	1.36	1.45	1.69	1.27	1.44	1.36	1.37	1.98	1.72
25	5.6	10.1	10.8	6.8	3.4	3.6	4.5	4.8	7.2	5.7	3.1	4.0	8.2
	1.67	2.26	2.85	2.09	1.47	1.56	1.83	1.37	1.48	1.42	1.47	2.13	1.78
50	6.5	11.3	12.1	7.8	4.0	4.2	5.2	5.7	8.1	6.5	3.6	4.6	9.2
	1.88	2.36	2.98	2.35	1.65	1.75	2.05	1.53	1.54	1.54	1.65	2.40	1.87
100	7.8	12.7	13.6	9.3	4.8	5.0	6.2	6.8	9.2	7.6	4.3	5.5	10.6
	2.00	2.52	3.19	2.50	1.75	1.86	2.18	1.63	1.65	1.65	1.76	2.55	1.99
200	9.6	14.5	15.6	11.6	6.0	6.3	7.7	8.4	10.6	9.1	5.4	6.8	12.3
	1.91	2.46	3.11	2.39	1.67	1.78	2.08	1.56	1.61	1.59	1.68	2.44	2.01
Freq	7.9	30.2	26.0	8.0	3.2	3.2	3.7	3.8	4.1	3.7	2.4	3.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	7.6	7.9	4.8	2.5	2.7	3.3	3.5	5.2	4.1	2.3	3.0	6.0
	1.48	2.27	2.72	1.88	1.35	1.46	1.60	1.23	1.42	1.33	1.47	2.06	1.72
25	5.7	9.2	9.6	6.0	3.1	3.3	4.0	4.4	6.4	5.0	2.9	3.8	7.3
	1.54	2.32	2.79	2.01	1.44	1.56	1.71	1.31	1.46	1.40	1.56	2.20	1.77
50	6.7	10.5	11.0	7.0	3.7	3.9	4.8	5.3	7.3	5.8	3.5	4.4	8.4
	1.63	2.41	2.90	2.22	1.58	1.72	1.90	1.45	1.52	1.49	1.73	2.44	1.84
100	7.8	11.9	12.5	8.3	4.4	4.7	5.7	6.4	8.4	6.9	4.1	5.2	9.7
	1.78	2.57	3.11	2.44	1.74	1.89	2.08	1.59	1.63	1.64	1.90	2.69	1.97
200	9.2	13.6	14.4	10.3	5.4	5.8	7.0	7.8	9.7	8.2	5.1	6.4	11.3
	1.73	2.55	3.07	2.34	1.67	1.81	1.99	1.52	1.60	1.58	1.82	2.57	1.99
Freq	9.7	29.9	24.6	7.6	3.2	3.3	3.7	3.8	4.1	3.6	2.5	4.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	6.0	6.1	3.7	2.0	2.2	2.6	2.9	4.0	3.0	1.9	2.5	4.7
	1.61	2.35	2.63	1.81	1.37	1.49	1.55	1.21	1.41	1.30	1.48	2.04	1.73
25	5.6	7.8	7.9	4.8	2.6	2.9	3.4	3.8	5.2	4.0	2.5	3.3	6.1
	1.66	2.40	2.69	1.92	1.46	1.58	1.64	1.27	1.45	1.36	1.56	2.16	1.77
50	6.7	9.2	9.4	5.9	3.2	3.5	4.1	4.7	6.2	4.8	3.0	3.9	7.3
	1.73	2.47	2.79	2.08	1.58	1.72	1.78	1.35	1.50	1.44	1.70	2.35	1.83
100	7.8	10.7	10.9	7.1	3.9	4.3	5.0	5.7	7.3	5.8	3.7	4.7	8.6
	1.85	2.61	2.95	2.37	1.79	1.95	2.03	1.52	1.59	1.60	1.93	2.68	1.94
200	9.2	12.4	12.7	8.6	4.8	5.2	6.1	6.8	8.5	6.9	4.5	5.8	10.1
	1.87	2.66	3.00	2.28	1.73	1.88	1.95	1.48	1.61	1.57	1.86	2.58	1.98
Freq	12.2	29.5	22.6	7.0	3.2	3.3	3.7	3.8	4.1	3.4	2.6	4.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.7	838	6.2	324	5.4	213	4.2	101
25	9.5	1071	7.3	508	6.5	370	5.5	217
50	10.1	1276	8.2	693	7.5	534	6.5	348
100	10.8	1559	9.4	961	8.6	759	7.6	532
200	11.6	1981	10.9	1515	10.1	1197	8.9	843

Valencia

39° 07′ 00″ N	00° 28′ 00″ E	UTM 31	E 280970 m	N 4332852 m	62 m a.s.l.

Location E of the city of Valencia. The distance to the Mediterranean Sea is 15 km in an easterly direction. The anemometer is situated on top of a 13-m high building, 7 m above the roof.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	250	0.30										
30	0.01	250	0.30										
60	0.01	250	0.40										
90	0.01	200	0.40	12000	0.00								
120	0.01	400	0.40	13000	0.00								
150	0.01	1250	0.30										
180	0.01	1250	0.30										
210	0.01	1250	0.30										
240	0.01	2000	0.30										
270	0.01	2000	0.30										
300	0.01	1750	0.30										
330	0.01	500	0.30										

Height of anemometer: 20.0 m a.g.l. Period: 72060603-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.6	571	47	99	66	51	42	24	20	15	37	10	9	6	2	2.2	0.82
30	5.5	564	39	91	80	64	60	36	21	14	19	5	3	1	2	2.3	0.92
60	10.9	280	41	107	134	139	130	72	38	22	27	5	2	2	0	4.4	1.70
90	10.5	316	21	75	109	151	145	110	48	15	10	1	0	0	0	4.4	2.02
120	11.1	286	26	69	104	152	164	119	48	22	10	0	0	0	0	4.7	2.21
150	5.0	611	24	65	71	68	73	47	18	15	8	0	0	0	0	2.0	0.96
180	4.1	801	16	52	43	34	32	12	6	3	1	0	0	0	0	0.5	0.59
210	4.2	776	16	49	47	36	35	19	11	5	5	0	0	0	0	0.7	0.62
240	8.1	390	34	73	63	67	87	76	61	44	69	20	9	2	3	4.6	1.32
270	14.2	232	39	68	73	72	78	72	54	50	124	66	40	18	10	6.7	1.53
300	12.8	258	59	158	113	104	82	46	34	26	61	26	17	12	5	4.4	1.18
330	8.1	401	41	126	110	95	63	42	28	23	41	14	10	6	1	3.6	1.11
Total	100.0	384	36	91	92	97	93	65	38	25	43	17	10	5	3	4.2	1.24

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.2	3.3	2.5	2.1	1.4	1.0	0.9	1.1	1.4	2.1	2.5	3.7	2.1
3	3.3	3.3	3.0	2.2	1.4	1.2	0.8	1.0	1.2	2.4	2.6	3.6	2.1
6	3.2	3.3	2.7	2.1	1.5	1.2	1.3	1.0	1.3	2.5	2.7	3.7	2.2
9	3.7	4.2	4.0	3.5	3.0	2.2	1.7	1.6	1.9	3.5	3.3	4.1	3.0
12	4.4	5.1	5.4	5.6	5.6	5.4	5.2	4.9	4.1	4.4	3.5	4.7	4.8
15	5.6	6.3	6.8	6.5	6.3	6.1	6.2	5.9	5.6	5.8	5.2	5.8	6.0
18	3.6	4.4	4.8	4.8	4.5	4.9	4.8	4.6	3.8	3.2	2.4	3.4	4.1
21	3.0	3.1	2.5	2.1	1.6	1.5	1.6	1.3	1.3	2.3	2.4	3.4	2.2
Day	3.8	4.1	4.0	3.6	3.2	2.9	2.8	2.7	2.6	3.3	3.1	4.1	3.3

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	3.7	6.8	6.7	6.6	5.3	1.6	1.2	5.0	8.2	6.8	5.5	5.8
	1.01	0.95	1.68	1.80	2.05	1.73	0.83	0.76	1.26	1.59	1.36	1.24	1.31
25	4.8	4.1	7.5	7.4	7.2	5.9	1.8	1.4	5.5	8.9	7.4	6.1	6.3
	1.02	0.96	1.73	1.86	2.11	1.79	0.85	0.78	1.29	1.61	1.38	1.26	1.34
50	5.2	4.4	8.0	7.9	7.7	6.3	1.9	1.5	5.9	9.6	7.9	6.5	6.8
	1.05	0.99	1.77	1.91	2.17	1.83	0.87	0.80	1.33	1.65	1.41	1.30	1.37
100	5.5	4.7	8.6	8.6	8.4	6.8	2.1	1.6	6.3	10.2	8.4	6.9	7.3
	1.04	0.97	1.72	1.85	2.10	1.77	0.85	0.77	1.29	1.63	1.39	1.27	1.35
200	5.9	5.0	9.5	9.5	9.3	7.5	2.2	1.7	6.9	11.0	9.1	7.5	7.9
	1.01	0.95	1.64	1.75	1.99	1.69	0.81	0.74	1.24	1.58	1.35	1.23	1.31
Freq	6.5	5.5	8.8	10.7	10.9	7.3	4.4	4.2	6.7	12.0	13.1	9.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.5	5.0	4.6	4.5	2.7	0.6	0.6	3.9	6.0	4.3	3.7	3.9
	0.85	0.87	1.55	1.58	1.74	1.12	0.62	0.60	1.21	1.47	1.17	1.09	1.16
25	3.2	3.0	6.0	5.5	5.5	3.2	0.8	0.8	4.7	7.1	5.1	4.5	4.7
	0.87	0.91	1.67	1.70	1.88	1.20	0.65	0.63	1.29	1.52	1.21	1.14	1.22
50	3.7	3.6	6.9	6.4	6.3	3.8	1.0	1.0	5.5	8.0	5.8	5.2	5.5
	0.91	0.98	1.86	1.91	2.12	1.34	0.72	0.69	1.42	1.60	1.29	1.23	1.31
100	4.3	4.2	8.2	7.6	7.5	4.6	1.3	1.2	6.5	9.2	6.8	6.1	6.4
	0.97	1.04	1.98	2.03	2.25	1.42	0.75	0.73	1.52	1.71	1.38	1.31	1.40
200	4.9	4.9	10.2	9.4	9.4	5.7	1.5	1.5	8.0	10.6	7.9	7.1	7.7
	0.94	1.01	1.90	1.94	2.15	1.36	0.73	0.70	1.46	1.66	1.34	1.26	1.37
Freq	5.9	5.5	10.1	10.6	11.1	5.9	4.2	4.2	7.6	13.5	12.9	8.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.2	4.4	4.0	3.9	1.9	0.5	0.6	3.5	5.3	3.6	3.2	3.4
	0.83	0.89	1.59	1.59	1.72	1.00	0.60	0.61	1.25	1.49	1.15	1.08	1.17
25	2.7	2.8	5.5	4.9	4.9	2.4	0.6	0.7	4.4	6.5	4.4	4.0	4.2
	0.85	0.93	1.69	1.71	1.84	1.06	0.63	0.64	1.33	1.53	1.20	1.13	1.21
50	3.2	3.3	6.4	5.8	5.7	2.9	0.8	0.9	5.2	7.4	5.2	4.7	5.0
	0.88	0.99	1.87	1.88	2.04	1.17	0.68	0.69	1.45	1.60	1.27	1.20	1.29
100	3.8	4.0	7.7	6.9	6.8	3.5	1.0	1.2	6.3	8.6	6.1	5.5	5.9
	0.93	1.07	2.05	2.07	2.24	1.27	0.73	0.74	1.59	1.73	1.38	1.31	1.40
200	4.3	4.7	9.4	8.5	8.4	4.3	1.2	1.4	7.6	9.9	7.2	6.5	7.1
	0.92	1.04	1.96	1.98	2.14	1.22	0.70	0.72	1.53	1.69	1.34	1.26	1.37
Freq	5.7	5.5	10.6	10.6	11.1	5.4	4.1	4.2	8.0	14.0	12.8	8.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.7	2.0	3.5	3.1	3.0	1.2	0.6	0.8	3.0	4.1	2.8	2.5	2.7
	0.82	0.97	1.63	1.62	1.70	0.90	0.71	0.70	1.30	1.47	1.16	1.08	1.18
25	2.2	2.7	4.6	4.1	4.0	1.7	0.8	1.0	4.0	5.3	3.7	3.3	3.6
	0.83	1.01	1.73	1.72	1.80	0.95	0.75	0.73	1.37	1.51	1.20	1.12	1.22
50	2.7	3.3	5.6	5.0	4.9	2.1	1.0	1.3	4.8	6.3	4.4	4.0	4.3
	0.86	1.07	1.88	1.87	1.95	1.02	0.80	0.78	1.46	1.56	1.26	1.18	1.29
100	3.2	4.0	6.8	6.0	5.9	2.6	1.3	1.8	5.8	7.5	5.3	4.9	5.3
	0.90	1.19	2.13	2.12	2.22	1.15	0.89	0.87	1.63	1.67	1.38	1.29	1.40
200	3.8	4.8	8.3	7.3	7.2	3.1	1.6	2.1	7.0	8.7	6.3	5.8	6.3
	0.91	1.16	2.06	2.05	2.14	1.12	0.87	0.85	1.59	1.69	1.37	1.28	1.40
Freq	5.6	5.8	10.9	10.6	10.7	4.9	4.1	4.6	8.6	14.1	12.2	7.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.3	307	3.7	134	3.2	88	2.6	42
25	5.8	388	4.4	205	4.0	150	3.4	88
50	6.2	458	5.0	267	4.6	210	4.0	138
100	6.7	585	5.9	376	5.4	293	4.8	202
200	7.3	798	7.1	680	6.5	523	5.7	349

Zaragoza

41° 40′ 14″ N	01° 01′ 15″ W	UTM 30	E 664764 m	N 4615173 m	247 m a.s.l.

The airport of Zaragoza is located in the rather open NW–SE oriented Ebro Valley, the river being 8–9 km to the NE. The NE bank of the river forms a 100-m escarpment. A plateau with altitudes of 250–350 m (500–600 m a.s.l.) is found 15 km to the SSW.
The anemometer is situated 3 m above the roof of a 20-m high building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.30											-19	-10
30	0.30											-27	2
60	0.30											-14	11
90	0.15	750	0.30									2	8
120	0.05	3500	0.30									7	-1
150	0.01	750	0.05	4000	0.30								-8
180	0.01	750	0.05	4000	0.30							-15	-9
210	0.01	750	0.05	3000	0.30							-23	1
240	0.01	1000	0.05	2000	0.30							-13	10
270	0.01	2000	0.05	4000	0.30							2	7
300	0.03	1500	0.13	3000	0.30								-1
330	0.30											-1	-10

Height of anemometer: 23.0 m a.g.l. Period: 72060609–85123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	2.4	466	112	114	78	64	29	24	20	20	31	19	10	6	8	2.4	0.76
30	2.0	550	129	166	62	51	14	10	1	0	1	0	2	3	10	1.7	0.70
60	3.9	328	126	185	174	100	49	26	5	3	3	1	0	1	0	2.9	1.53
90	10.4	150	115	194	177	158	92	63	27	12	9	1	0	0	0	3.9	1.88
120	8.8	155	120	187	161	120	92	76	40	19	20	5	1	1	1	4.1	1.50
150	2.8	453	147	170	90	57	33	23	10	9	8	1	0	0	0	2.2	1.11
180	2.0	582	121	110	77	42	27	22	6	3	8	0	0	1	0	1.5	0.87
210	2.5	483	90	113	84	58	51	43	18	22	27	7	1	1	1	2.5	0.96
240	5.6	225	105	130	102	77	69	69	51	46	79	28	12	5	2	4.7	1.31
270	15.2	87	54	86	93	107	113	118	102	63	104	45	19	8	1	6.8	2.00
300	29.5	49	32	69	80	101	90	108	97	82	165	79	35	9	3	7.9	2.24
330	14.8	89	39	68	69	80	78	85	91	83	183	86	38	8	3	8.1	2.29
Total	100.0	154	71	110	102	100	82	83	68	53	101	46	20	6	2	6.0	1.58

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.7	4.6	5.0	5.3	4.9	5.1	5.8	5.8	4.6	4.2	4.1	5.4	5.0
3	4.5	4.2	4.7	4.9	4.2	4.7	5.6	5.1	4.0	3.9	4.0	4.9	4.6
6	4.4	4.4	4.3	4.8	3.8	4.1	4.7	4.4	3.4	3.6	4.0	4.6	4.2
9	4.8	4.8	5.7	6.4	5.2	5.4	5.3	5.4	4.6	4.5	4.5	4.8	5.1
12	5.9	6.3	6.8	6.4	5.5	5.0	4.8	5.2	4.8	5.7	5.4	5.7	5.6
15	6.1	6.2	6.9	6.6	5.6	5.3	5.2	5.4	4.8	5.6	5.5	5.8	5.7
18	4.9	5.1	5.6	6.3	5.5	5.6	5.7	5.5	3.9	4.3	4.7	5.1	5.2
21	5.0	4.6	5.6	5.5	4.6	5.1	5.9	5.6	4.6	4.6	4.5	5.2	5.1
Day	5.0	5.0	5.6	5.8	4.9	5.0	5.4	5.3	4.3	4.6	4.7	5.2	5.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	12.6	8.2	6.2	6.0	5.5	4.6	3.3	4.3	8.2	8.7	10.1	11.6	8.7
	1.94	1.12	1.43	1.95	1.81	1.54	1.20	1.00	1.61	2.10	2.31	2.28	1.60
25	13.7	8.9	6.7	6.6	6.0	5.0	3.6	4.8	9.0	9.6	11.0	12.6	9.5
	1.95	1.12	1.47	2.01	1.87	1.58	1.24	1.02	1.63	2.14	2.36	2.31	1.63
50	14.5	9.5	7.2	7.1	6.5	5.4	3.9	5.1	9.6	10.2	11.7	13.4	10.2
	1.97	1.13	1.51	2.06	1.91	1.62	1.27	1.04	1.67	2.20	2.42	2.35	1.65
100	15.4	10.1	7.8	7.7	7.0	5.8	4.2	5.4	10.2	11.0	12.6	14.4	10.9
	1.98	1.13	1.47	2.00	1.85	1.58	1.23	1.02	1.65	2.15	2.38	2.34	1.65
200	16.4	10.7	8.4	8.5	7.7	6.4	4.6	5.8	11.0	12.0	13.6	15.4	11.8
	1.95	1.12	1.41	1.90	1.76	1.49	1.17	1.00	1.60	2.06	2.30	2.29	1.64
Freq	9.9	4.5	5.1	7.5	7.2	4.5	2.8	3.2	6.9	12.3	18.7	17.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.2	4.3	4.3	4.1	3.7	2.8	2.0	3.4	6.1	6.1	7.4	8.8	6.2
	1.66	0.87	1.40	1.66	1.46	1.22	0.94	0.96	1.53	1.87	2.12	2.16	1.47
25	10.7	5.0	5.2	4.9	4.4	3.5	2.4	4.0	7.2	7.2	8.7	10.2	7.3
	1.68	0.88	1.51	1.79	1.57	1.31	1.01	0.99	1.59	1.99	2.21	2.21	1.52
50	11.9	5.5	6.1	5.7	5.2	4.1	2.9	4.6	8.1	8.3	9.9	11.4	8.3
	1.72	0.89	1.69	2.02	1.77	1.47	1.13	1.04	1.69	2.19	2.36	2.30	1.59
100	13.2	6.2	7.3	6.8	6.2	4.9	3.5	5.3	9.3	9.7	11.2	12.8	9.5
	1.78	0.91	1.80	2.15	1.88	1.56	1.19	1.11	1.81	2.35	2.53	2.45	1.70
200	14.6	6.8	9.0	8.4	7.6	6.0	4.3	6.1	10.8	11.7	13.2	14.6	11.2
	1.78	0.92	1.72	2.05	1.79	1.49	1.14	1.08	1.76	2.25	2.45	2.40	1.73
Freq	8.0	3.7	5.9	8.0	6.8	3.7	2.6	3.5	8.1	13.6	20.3	15.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.0	3.2	3.8	3.5	3.2	2.4	1.6	3.0	5.3	5.3	6.5	7.8	5.4
	1.62	0.83	1.48	1.67	1.43	1.19	0.91	0.98	1.56	1.90	2.16	2.20	1.47
25	9.6	3.9	4.7	4.4	3.9	3.0	2.0	3.7	6.5	6.5	7.9	9.4	6.6
	1.64	0.83	1.58	1.79	1.53	1.26	0.97	1.00	1.62	2.01	2.24	2.25	1.52
50	10.9	4.4	5.6	5.2	4.6	3.5	2.5	4.3	7.5	7.5	9.1	10.7	7.6
	1.66	0.84	1.75	1.98	1.69	1.39	1.06	1.04	1.70	2.18	2.36	2.33	1.58
100	12.3	5.0	6.7	6.2	5.6	4.3	3.1	5.1	8.7	8.9	10.5	12.1	8.8
	1.71	0.86	1.92	2.18	1.85	1.52	1.16	1.12	1.85	2.40	2.58	2.47	1.69
200	13.8	5.6	8.2	7.6	6.8	5.3	3.7	5.8	10.1	10.8	12.3	13.9	10.3
	1.74	0.87	1.84	2.08	1.77	1.46	1.11	1.10	1.80	2.31	2.51	2.45	1.73
Freq	7.3	3.4	6.2	8.2	6.7	3.4	2.5	3.6	8.6	14.0	20.9	15.1	100.0

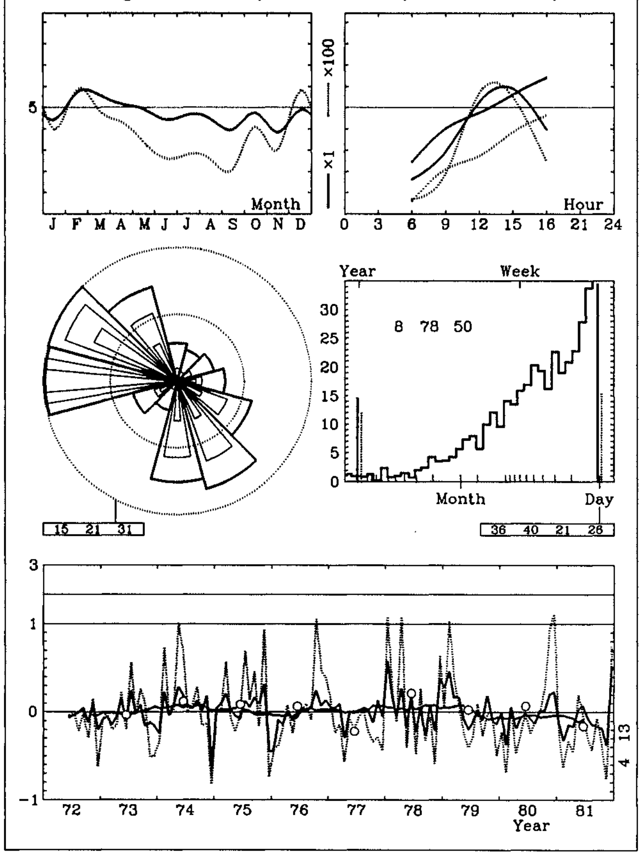
Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.2	2.3	3.0	2.8	2.5	1.8	1.3	2.7	4.2	4.2	5.2	6.2	4.2
	1.56	0.82	1.58	1.69	1.43	1.14	0.88	1.06	1.62	1.92	2.18	2.21	1.49
25	8.0	3.0	3.9	3.7	3.3	2.4	1.8	3.5	5.5	5.5	6.7	8.0	5.5
	1.58	0.83	1.68	1.79	1.51	1.20	0.93	1.08	1.67	2.01	2.24	2.26	1.53
50	9.4	3.5	4.8	4.4	4.0	2.9	2.2	4.2	6.6	6.6	8.0	9.4	6.6
	1.60	0.84	1.82	1.94	1.64	1.30	1.00	1.12	1.74	2.15	2.35	2.31	1.58
100	10.9	4.1	5.8	5.4	4.8	3.6	2.8	5.0	7.8	7.9	9.4	10.9	7.8
	1.63	0.86	2.08	2.21	1.87	1.48	1.12	1.20	1.88	2.40	2.53	2.42	1.67
200	12.4	4.7	7.0	6.6	5.9	4.3	3.4	5.9	9.1	9.5	11.0	12.6	9.2
	1.68	0.88	2.00	2.13	1.80	1.42	1.09	1.21	1.89	2.35	2.54	2.47	1.72
Freq	6.8	3.4	6.6	8.1	6.2	3.2	2.5	4.1	9.4	14.4	20.6	14.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.8	725	5.6	298	4.9	195	3.8	93
25	8.5	921	6.6	462	5.9	337	5.0	199
50	9.1	1095	7.4	626	6.8	483	5.9	317
100	9.7	1345	8.5	858	7.8	682	7.0	481
200	10.5	1722	10.0	1359	9.2	1078	8.2	760

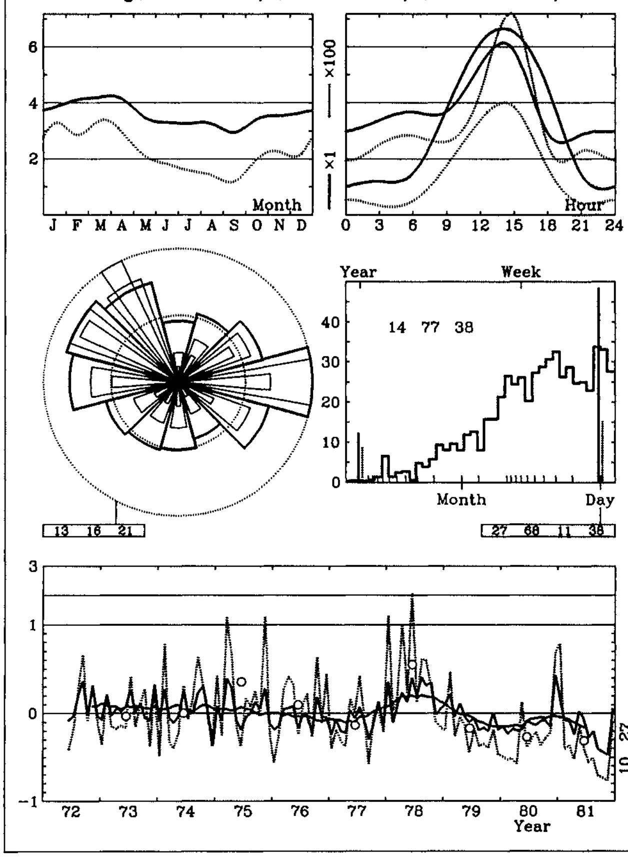
Albacete, Spain 1972–81

5.7 m agl, mean 4.7 m/s, st dev 3.9 m/s, cube 364. m^3/s^3



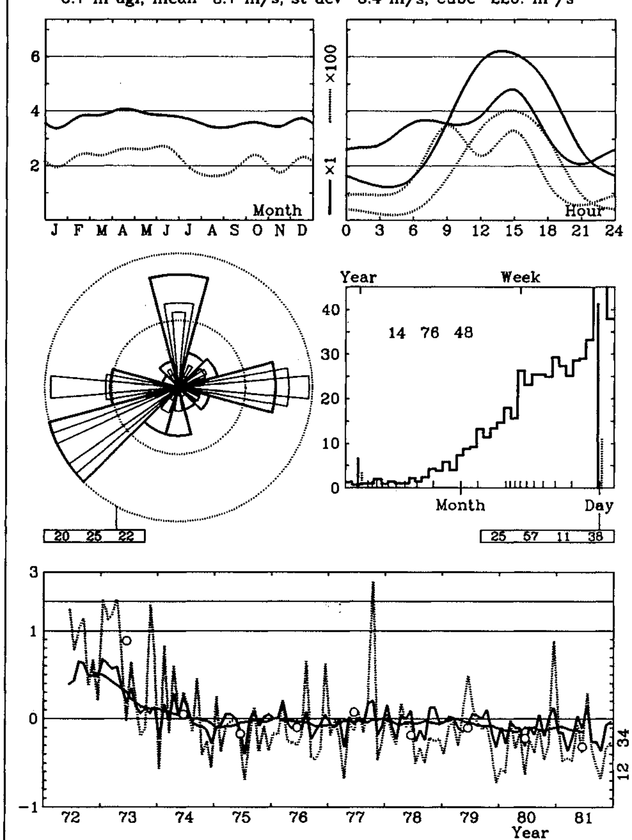
Alicante, Spain 1972–81

6.0 m agl, mean 3.6 m/s, st dev 3.5 m/s, cube 221. m^3/s^3



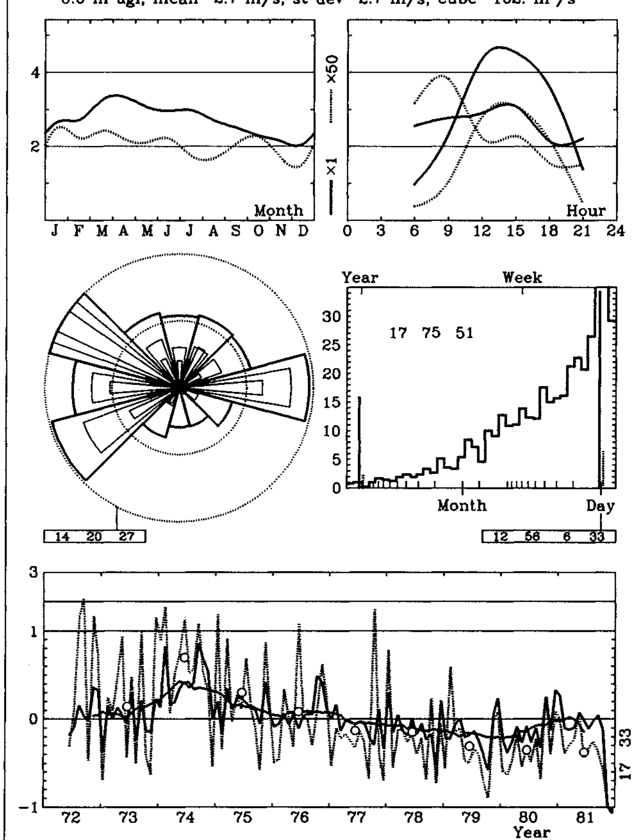
Almería, Spain 1972–81

6.7 m agl, mean 3.7 m/s, st dev 3.4 m/s, cube 220. m^3/s^3



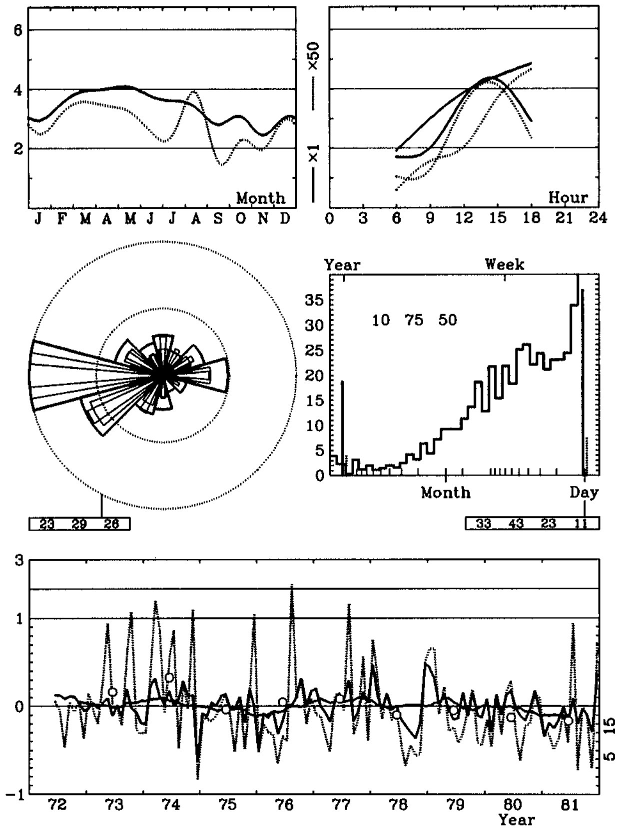
Avilés, Spain 1972–81

6.0 m agl, mean 2.7 m/s, st dev 2.7 m/s, cube 102. m^3/s^3



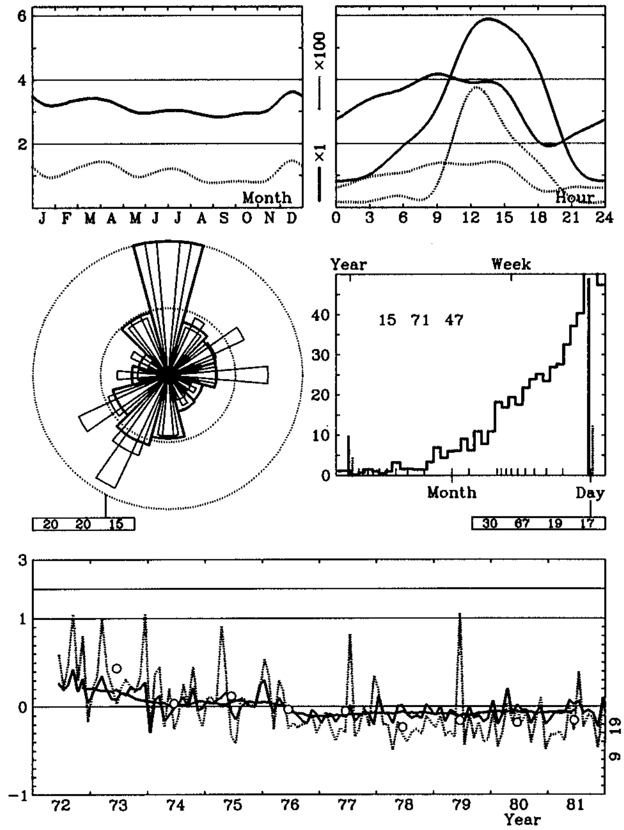
Badajoz, Spain 1972–81

13.0 m agl, mean 3.4 m/s, st dev 2.8 m/s, cube 140. m^3/s^3



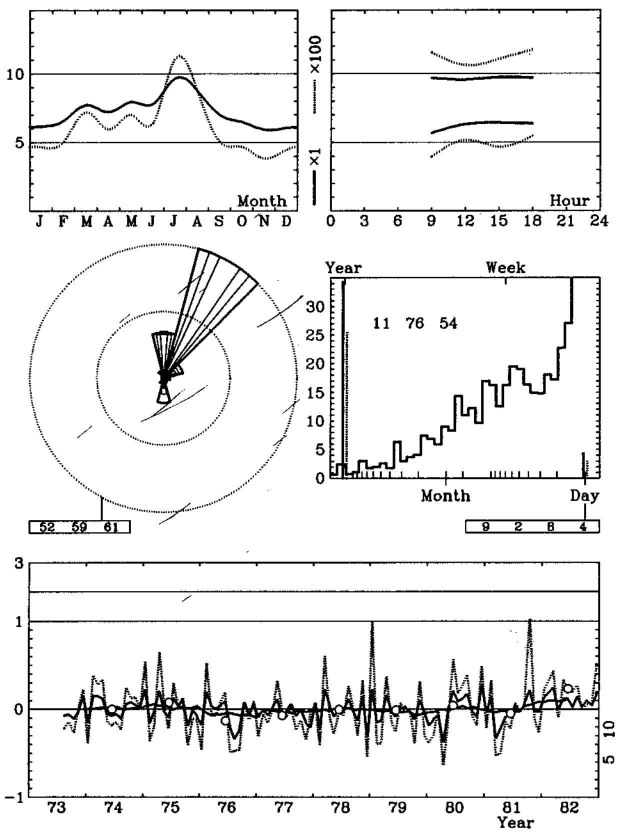
Barcelona, Spain 1972–81

6.0 m agl, mean 3.1 m/s, st dev 2.6 m/s, cube 107. m^3/s^3



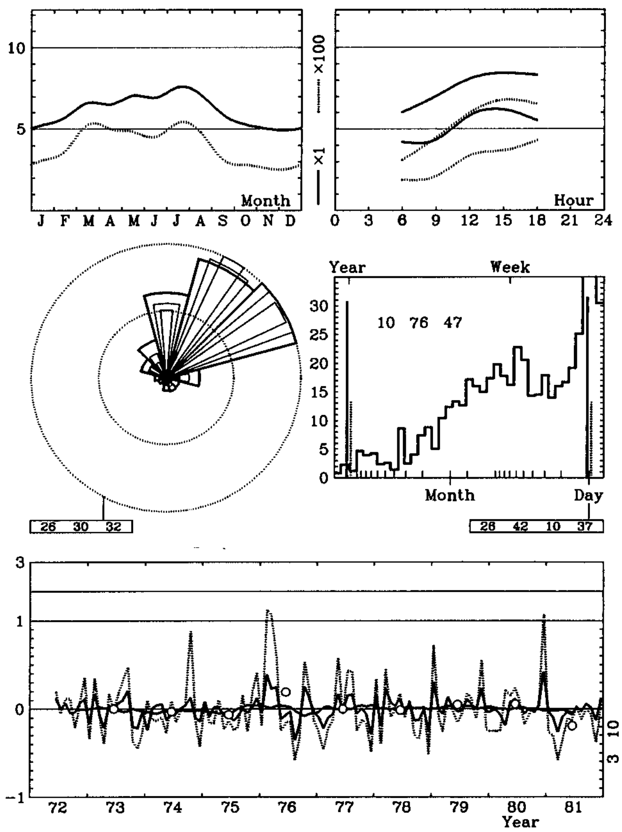
El Hierro, Spain 1973–82

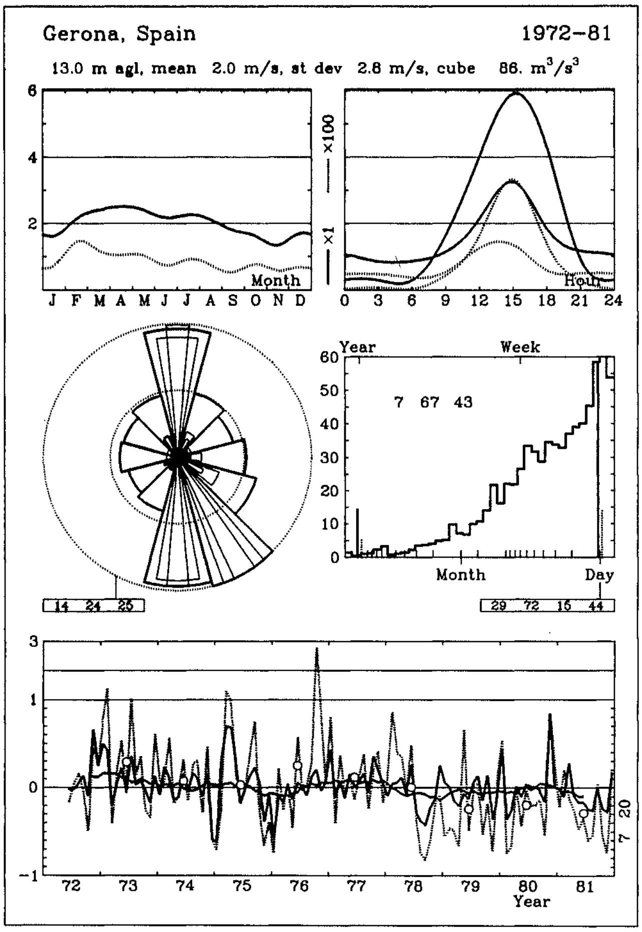
6.0 m agl, mean 7.3 m/s, st dev 3.3 m/s, cube 621. m^3/s^3

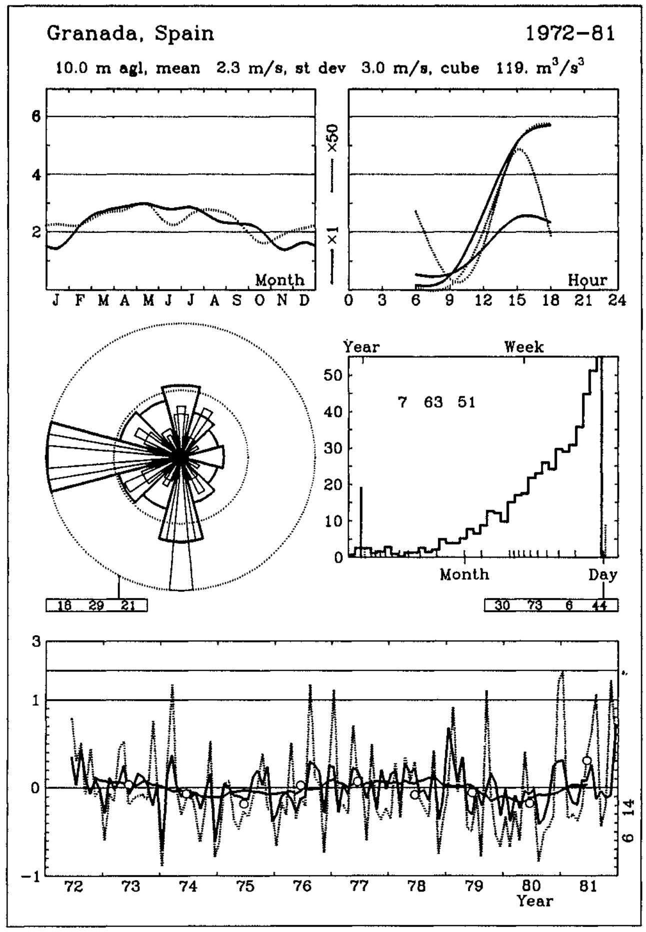


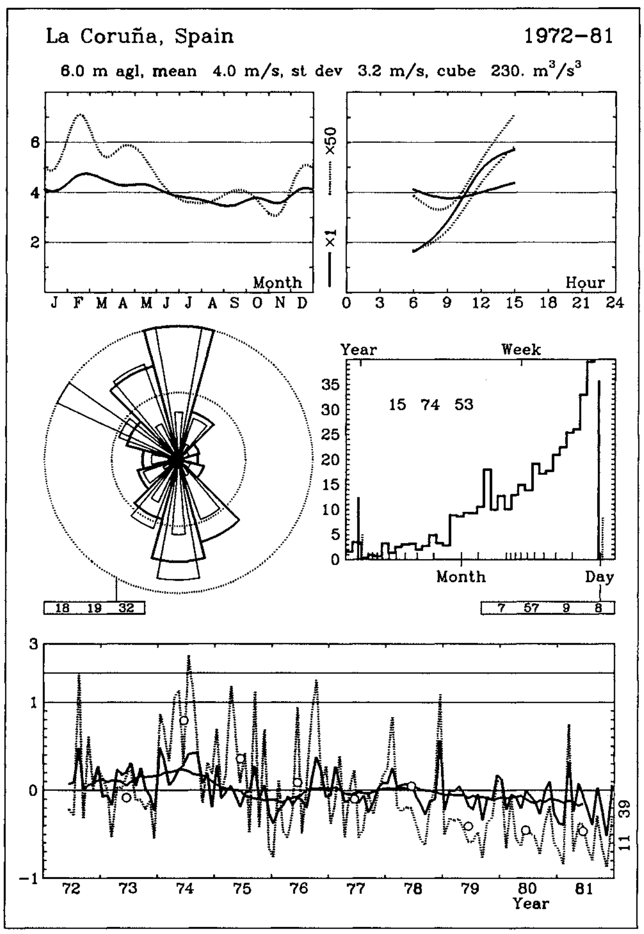
Fuerteventura Canarias, Spain 1972–81

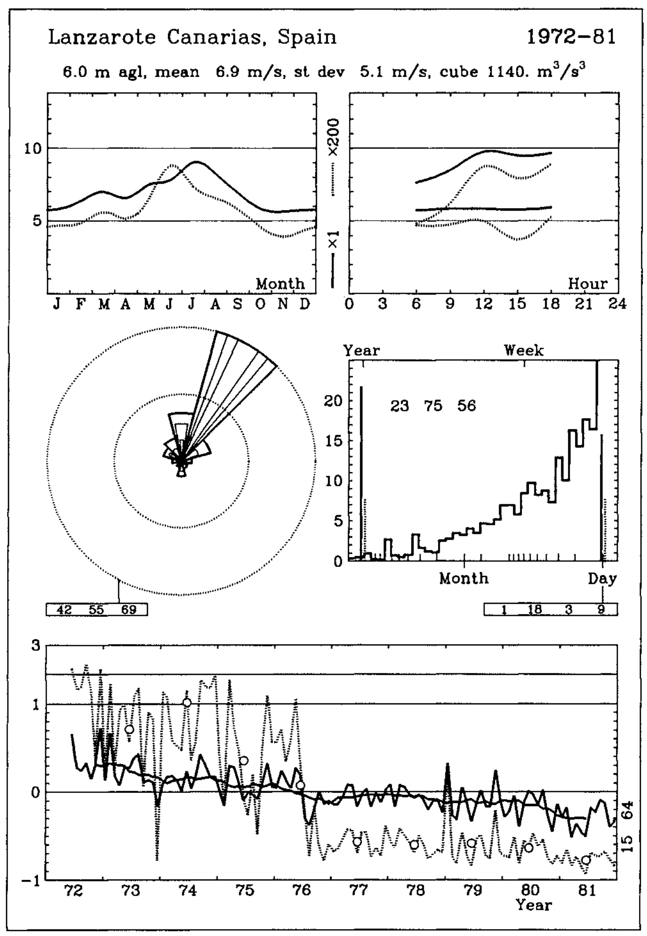
8.0 m agl, mean 8.2 m/s, st dev 3.0 m/s, cube 395. m^3/s^3




Gerona, Spain 1972–81
13.0 m agl, mean 2.0 m/s, st dev 2.8 m/s, cube 86. m³/s³
Month
Hour
Year
Week
7 67 43
Month
Day
14 24 25
29 72 15 44
Year
7 20

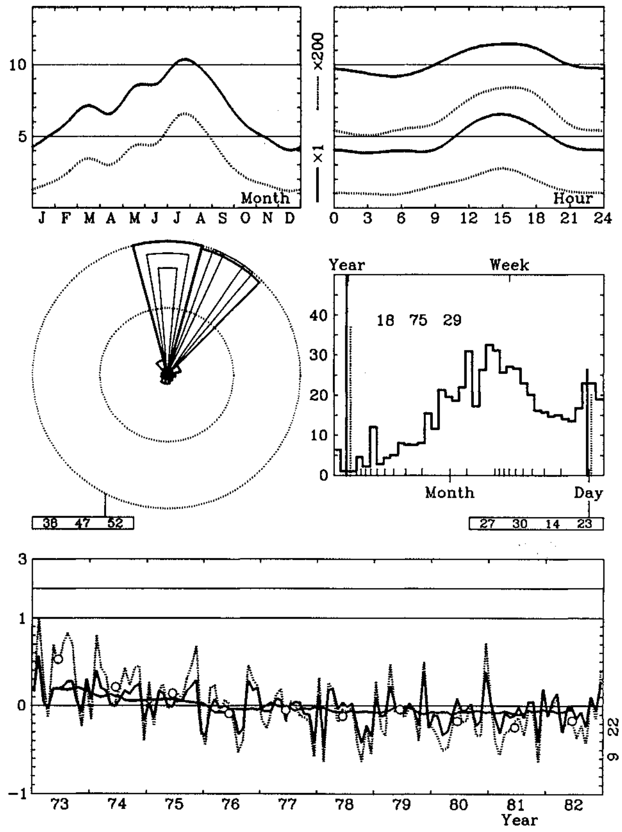

Granada, Spain 1972–81
10.0 m agl, mean 2.3 m/s, st dev 3.0 m/s, cube 119. m³/s³
Month
Hour
Year
Week
7 63 51
Month
Day
18 29 21
30 73 6 44
Year
6 14


La Coruña, Spain 1972–81
6.0 m agl, mean 4.0 m/s, st dev 3.2 m/s, cube 230. m³/s³
Month
Hour
Year
Week
15 74 53
Month
Day
18 19 32
7 57 9 8
Year
11 39


Lanzarote Canarias, Spain 1972–81
6.0 m agl, mean 6.9 m/s, st dev 5.1 m/s, cube 1140. m³/s³
Month
Hour
Year
Week
23 75 56
Month
Day
42 55 69
1 18 3 9
Year
15 64

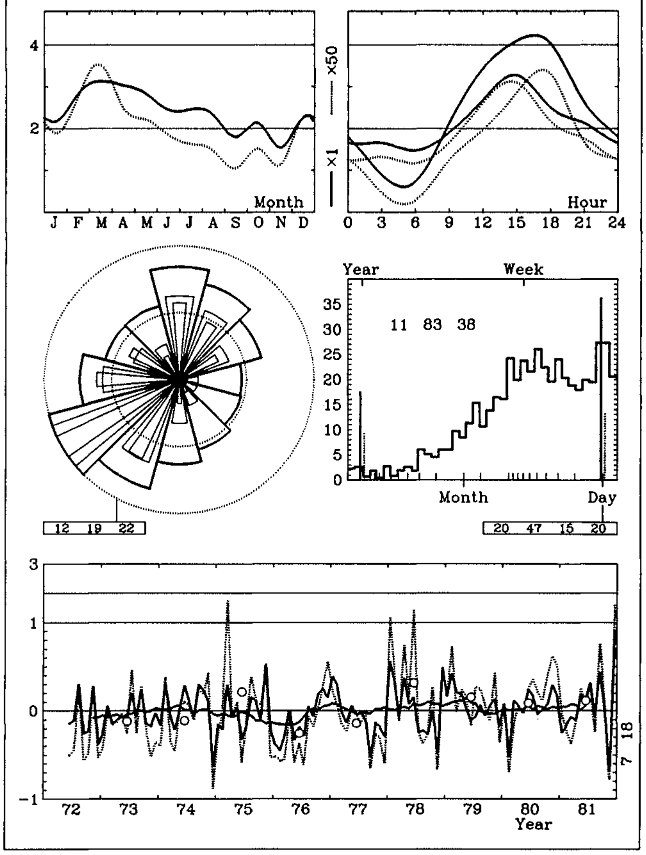
Las Palmas Canarias, Spain 1973–82

4.5 m agl, mean 7.0 m/s, st dev 4.0 m/s, cube 666. m^3/s^3



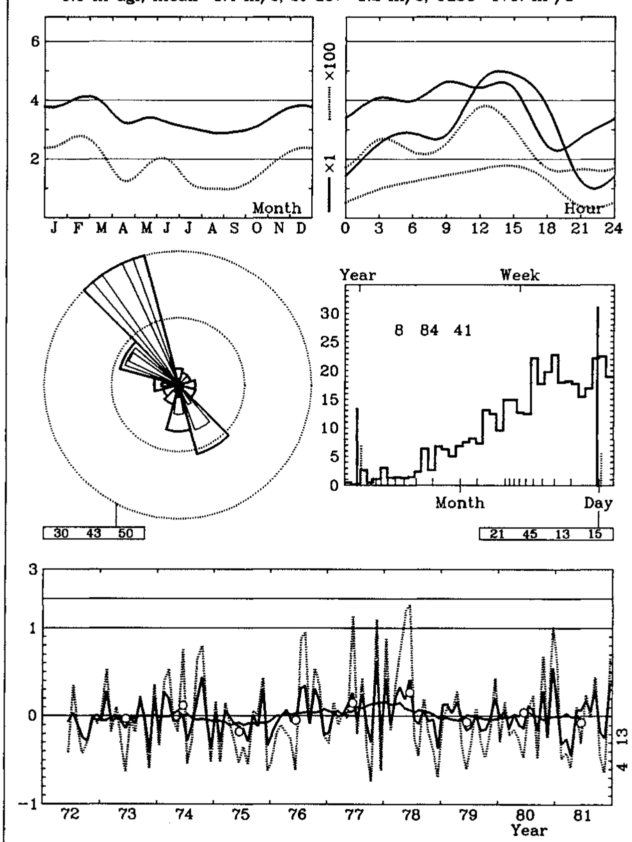
Madrid, Spain 1972–81

6.0 m agl, mean 2.4 m/s, st dev 2.9 m/s, cube 98. m^3/s^3



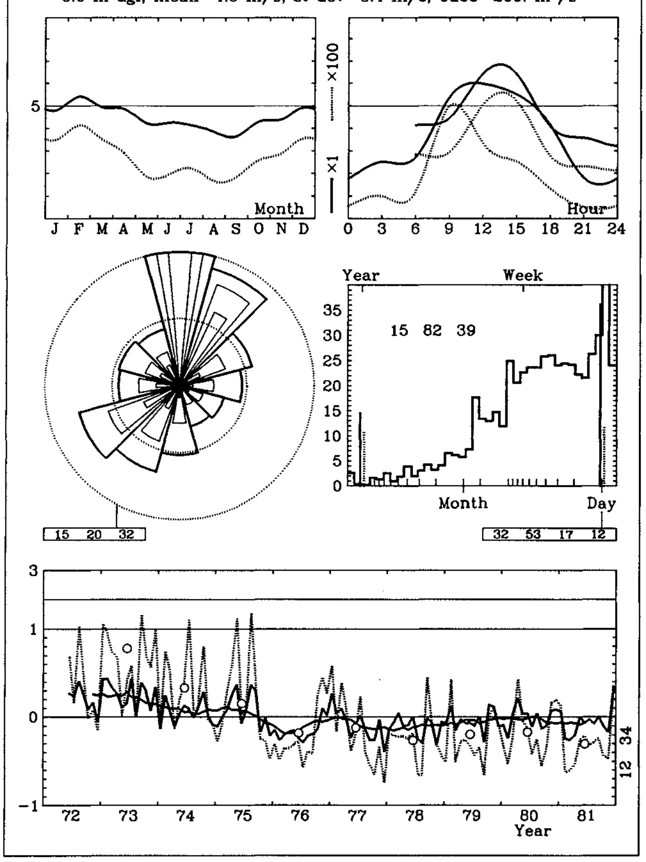
Málaga, Spain 1972–81

6.0 m agl, mean 3.4 m/s, st dev 3.2 m/s, cube 176. m^3/s^3



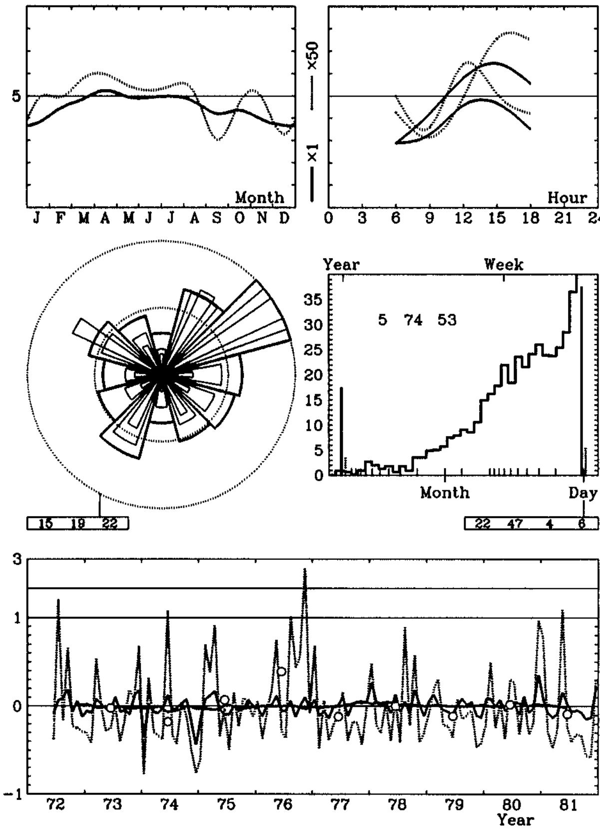
Menorca, Spain 1972–81

6.0 m agl, mean 4.5 m/s, st dev 3.4 m/s, cube 266. m^3/s^3



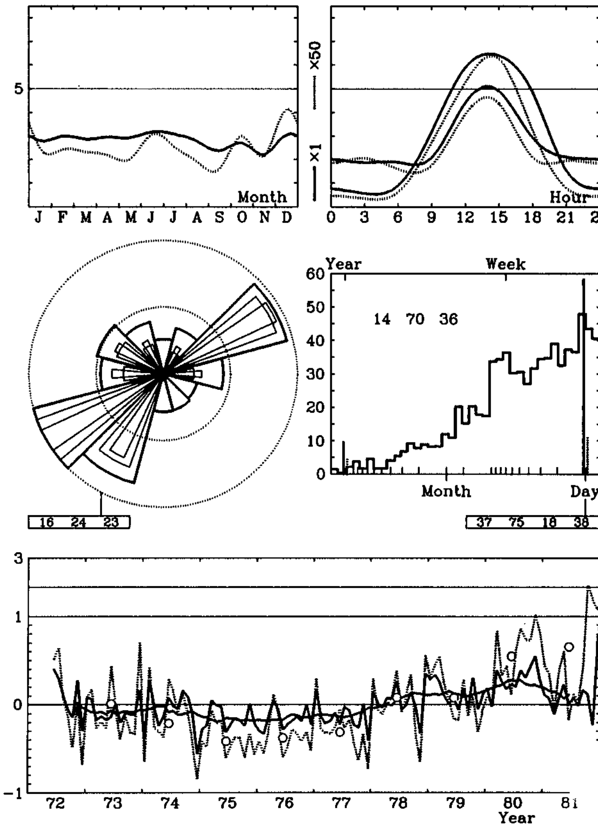
Murcia, Spain 1972–81

10.9 m agl, mean 4.5 m/s, st dev 2.9 m/s, cube 243. m^3/s^3



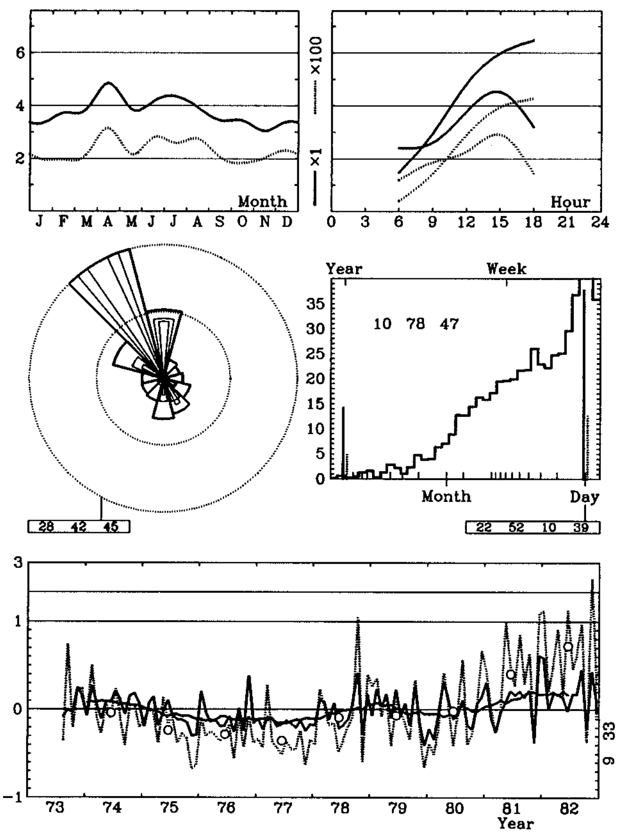
Palma de Mallorca, Spain 1972–81

6.0 m agl, mean 2.8 m/s, st dev 3.0 m/s, cube 125. m^3/s^3



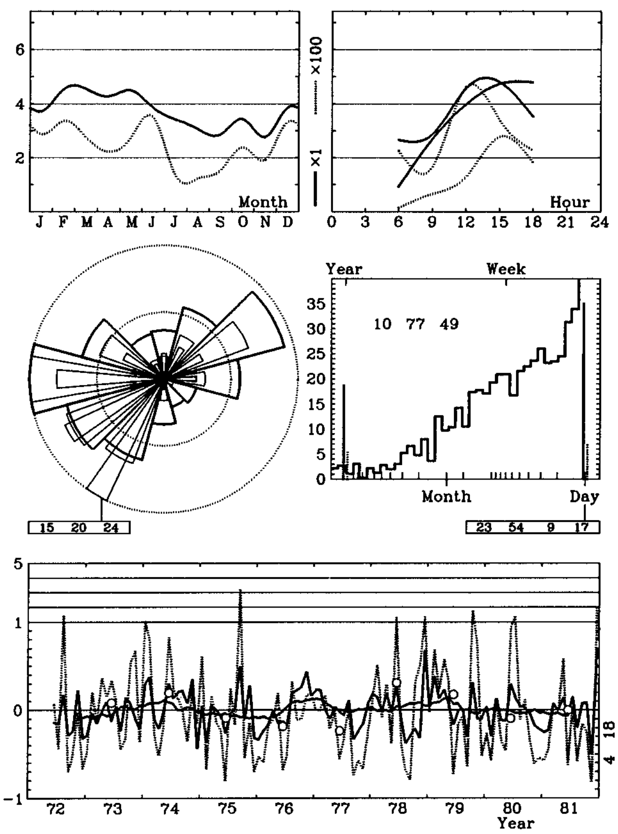
Pamplona, Spain 1973–82

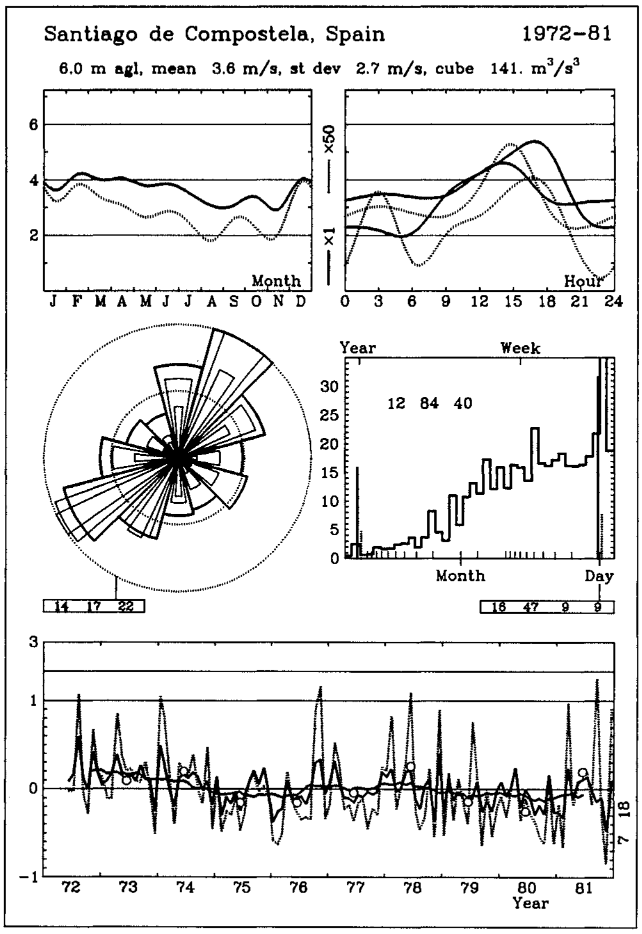
6.0 m agl, mean 3.8 m/s, st dev 3.6 m/s, cube 231. m^3/s^3

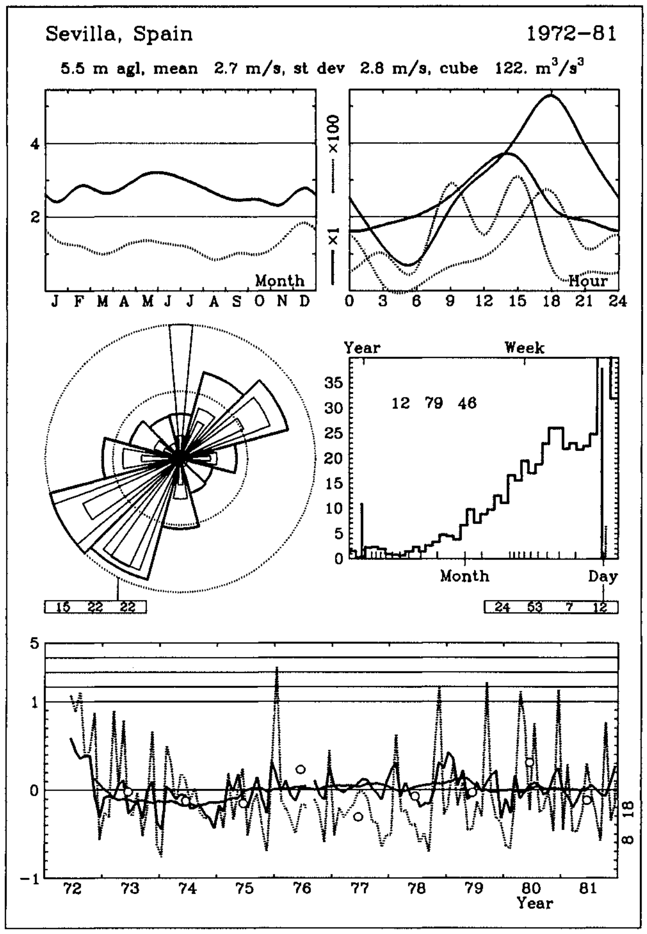


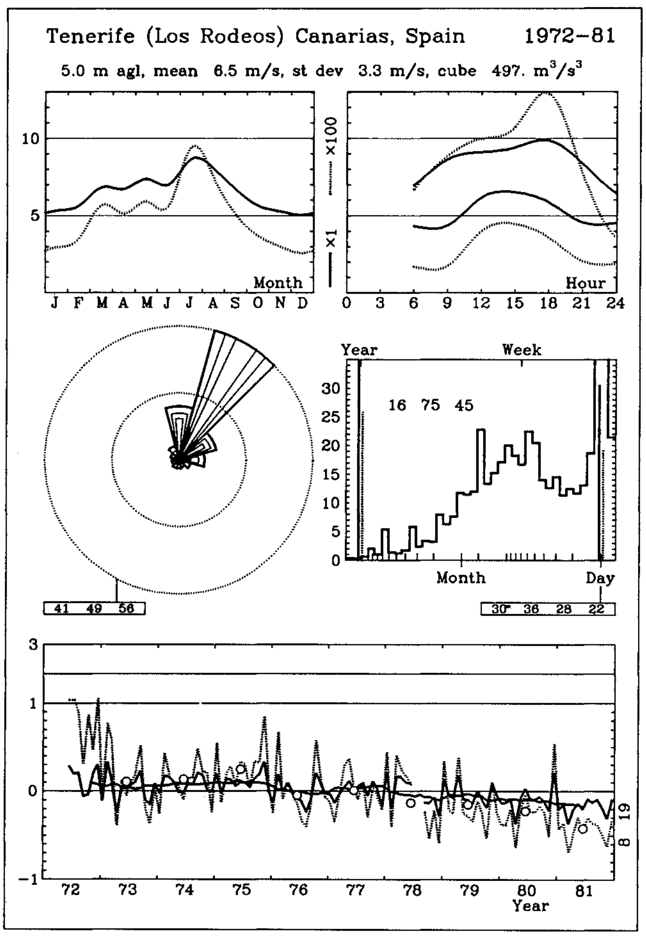
Salamanca, Spain 1972–81

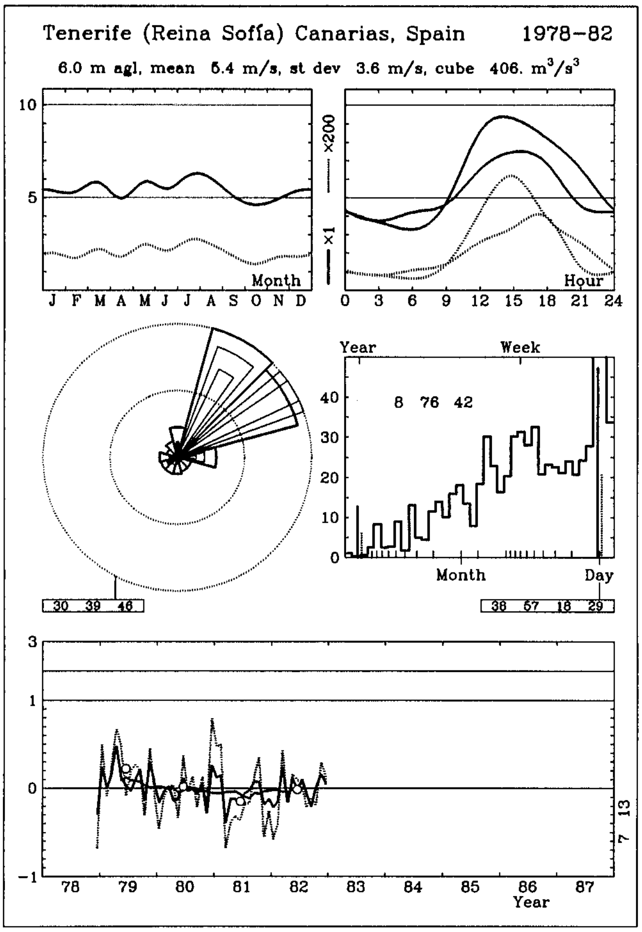
10.3 m agl, mean 3.7 m/s, st dev 3.4 m/s, cube 241. m^3/s^3

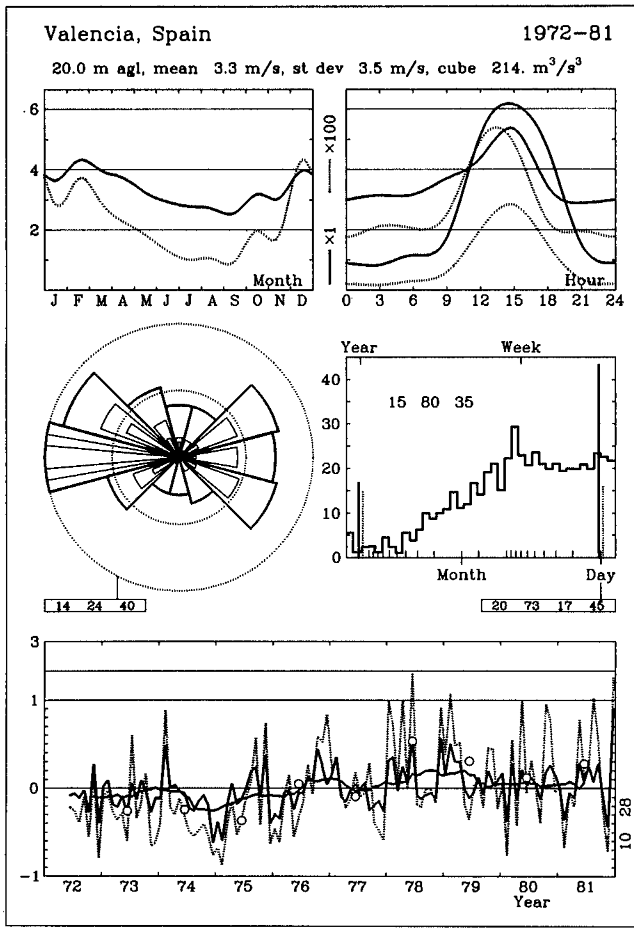


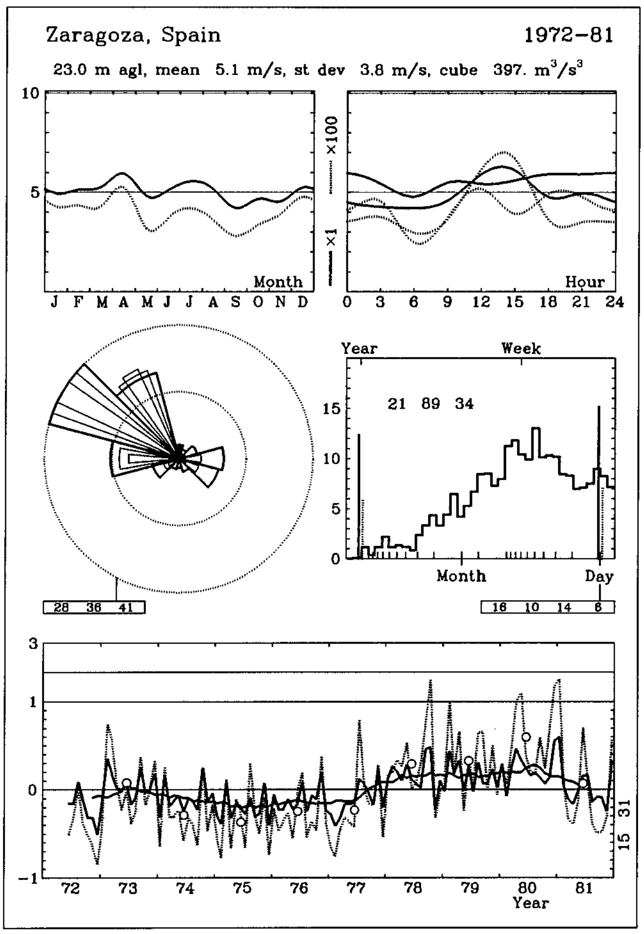

Santiago de Compostela, Spain 1972–81
6.0 m agl, mean 3.6 m/s, st dev 2.7 m/s, cube 141. m³/s³
Month
×50
×1
Hour
Year
Week
12 84 40
Month
Day
14 17 22
16 47 9 9
7 18
Year


Sevilla, Spain 1972–81
5.5 m agl, mean 2.7 m/s, st dev 2.8 m/s, cube 122. m³/s³
Month
×100
×1
Hour
Year
Week
12 79 46
Month
Day
15 22 22
24 53 7 12
8 18
Year


Tenerife (Los Rodeos) Canarias, Spain 1972–81
5.0 m agl, mean 6.5 m/s, st dev 3.3 m/s, cube 497. m³/s³
Month
×100
×1
Hour
Year
Week
16 75 45
Month
Day
41 49 56
30 36 28 22
8 19
Year


Tenerife (Reina Soffa) Canarias, Spain 1978–82
6.0 m agl, mean 5.4 m/s, st dev 3.6 m/s, cube 406. m³/s³
Month
Hour
×200
×1
Year Week
8 76 42
Month Day
30 39 46
38 57 18 29
7 13
Year


Valencia, Spain 1972–81
20.0 m agl, mean 3.3 m/s, st dev 3.5 m/s, cube 214. m³/s³
Month
Hour
×100
×1
Year Week
15 80 35
Month Day
14 24 40
20 73 17 45
10 28
Year


Zaragoza, Spain 1972–81
23.0 m agl, mean 5.1 m/s, st dev 3.8 m/s, cube 397. m³/s³
Month
Hour
×100
×1
Year Week
21 89 34
Month Day
28 36 41
16 10 14 6
15 31
Year

Bala

52° 54′ 00″ N	03° 35′ 00″ W	UTM 30	E 460760 m	N 5861429 m	163 m a.s.l.

Location in Wales at the northern end of Llyn Tegid (Bala Lake). The Irish Sea is 60 km to the N and W. The surrounding terrain is typical of the rugged mainland of Wales with several summits above 600 m.
The town of Bala is in the NW sector and the Bala Lake, which is 5 km long, occurs 750 m from the station in the SW sector. The area close to the station is open and flat.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	1000	0.30									-39	14
30	0.03	1000	0.30									-15	16
60	0.03	1500	0.30									1	5
90	0.03	750	0.30									-2	-9
120	0.03	500	0.30									-23	-19
150	0.03	500	0.30									-46	-10
180	0.03	500	0.30									-41	15
210	0.03	750	0.30									-16	17
240	0.03	750	0.30	2000	0.05								5
270	0.03	500	0.30									-2	-9
300	0.03											-20	-15
330	0.03	1000	0.30									-44	-9

Height of anemometer: 9.0 m a.g.l. Period: 75050100–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	4.1	251	268	125	176	93	41	28	12	2	2	1	0	0	0	2.7	1.44
30	5.6	245	313	117	112	71	52	47	29	7	7	0	0	0	0	2.6	1.20
60	12.4	236	293	91	115	87	62	52	27	14	17	4	2	0	0	3.0	1.21
90	8.5	213	319	102	123	79	58	49	26	13	12	2	3	0	0	2.9	1.20
120	3.9	250	290	126	164	80	48	21	10	4	6	1	0	0	0	2.6	1.33
150	3.3	118	207	148	250	120	78	40	24	9	5	0	0	0	0	3.7	2.00
180	3.8	117	171	161	210	143	87	56	32	9	14	1	0	0	0	3.9	1.87
210	8.9	127	142	99	136	117	107	98	65	47	49	6	6	1	1	5.0	1.72
240	31.2	55	90	69	145	129	126	123	86	65	71	31	8	3	0	6.1	2.02
270	10.7	90	136	94	154	131	107	91	73	41	55	20	5	2	0	5.2	1.72
300	3.3	203	241	137	163	83	69	55	19	13	8	6	3	0	0	3.3	1.37
330	4.3	212	245	135	204	95	52	28	10	7	11	1	1	0	0	3.1	1.51
Total	100.0	143	190	98	149	109	90	79	52	34	38	13	4	1	0	4.4	1.49

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.2	3.9	4.7	2.8	2.6	2.5	2.5	2.4	3.1	3.2	4.6	3.9	3.4
3	4.5	3.9	4.6	2.8	2.3	2.6	2.3	2.2	3.2	3.2	4.5	4.0	3.3
6	4.5	3.5	4.5	2.8	2.7	2.8	2.6	2.3	3.3	3.2	4.4	3.9	3.4
9	4.3	3.6	5.3	4.0	3.9	3.8	3.6	3.3	4.5	3.7	4.7	4.2	4.1
12	4.7	4.5	6.0	4.8	4.8	4.5	4.4	4.1	5.1	4.6	5.4	4.8	4.8
15	4.6	4.5	5.8	4.8	4.9	4.5	4.5	4.2	5.0	4.1	5.0	4.3	4.7
18	4.2	4.0	4.7	3.9	4.2	3.9	3.8	3.3	3.6	3.4	4.6	4.0	4.0
21	4.3	4.0	5.0	2.9	2.7	2.6	2.5	2.3	3.3	3.2	4.5	4.0	3.4
Day	4.4	4.0	5.1	3.6	3.5	3.5	3.3	3.1	3.9	3.6	4.7	4.1	3.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	6.2	5.2	4.9	5.7	8.4	11.8	11.8	9.9	9.2	8.6	8.6	8.6
	1.51	1.40	1.42	1.40	1.35	1.53	1.70	1.96	2.11	2.10	1.84	1.56	1.58
25	8.7	6.8	5.7	5.4	6.3	9.1	12.8	12.8	10.9	10.1	9.4	9.4	9.4
	1.53	1.43	1.46	1.44	1.38	1.55	1.71	1.98	2.14	2.15	1.87	1.58	1.60
50	9.3	7.3	6.1	5.8	6.7	9.8	13.6	13.6	11.6	10.8	10.0	10.0	10.1
	1.56	1.47	1.50	1.48	1.42	1.58	1.73	2.01	2.19	2.20	1.92	1.61	1.63
100	9.9	7.8	6.6	6.3	7.2	10.4	14.4	14.5	12.4	11.5	10.7	10.7	10.8
	1.55	1.44	1.45	1.44	1.38	1.57	1.73	2.01	2.16	2.16	1.88	1.60	1.63
200	10.6	8.4	7.3	6.9	7.8	11.1	15.3	15.5	13.4	12.5	11.6	11.4	11.6
	1.51	1.38	1.38	1.36	1.33	1.53	1.71	1.98	2.10	2.08	1.82	1.56	1.60
Freq	6.3	7.1	7.3	6.1	5.6	5.7	7.2	12.9	17.1	11.8	7.1	5.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	4.0	3.4	3.4	4.1	6.9	8.7	8.4	6.8	6.6	5.8	6.4	6.1
	1.33	1.21	1.20	1.19	1.20	1.59	1.62	1.88	1.95	1.79	1.57	1.44	1.46
25	6.2	4.8	4.1	4.1	4.9	8.1	10.2	9.8	8.0	7.8	6.9	7.5	7.2
	1.38	1.28	1.29	1.27	1.26	1.64	1.64	1.93	2.05	1.87	1.64	1.48	1.51
50	7.1	5.6	4.9	4.9	5.7	9.1	11.3	10.9	9.1	8.8	7.8	8.4	8.2
	1.46	1.39	1.44	1.43	1.36	1.71	1.67	1.99	2.19	2.00	1.75	1.54	1.58
100	8.1	6.6	5.8	5.8	6.7	10.2	12.6	12.2	10.4	10.1	9.0	9.5	9.4
	1.56	1.49	1.53	1.52	1.46	1.83	1.74	2.12	2.36	2.15	1.88	1.65	1.69
200	9.4	7.9	7.2	7.2	7.9	11.7	14.0	13.8	12.3	11.8	10.6	10.8	11.0
	1.52	1.43	1.47	1.45	1.41	1.78	1.74	2.08	2.28	2.08	1.82	1.61	1.69
Freq	6.5	7.3	7.3	5.6	5.7	5.4	7.8	14.7	17.8	9.5	6.6	5.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	3.4	2.9	3.0	3.7	6.3	7.7	7.2	5.8	5.8	5.0	5.7	5.4
	1.33	1.20	1.21	1.20	1.21	1.67	1.62	1.90	1.99	1.77	1.57	1.46	1.47
25	5.5	4.2	3.7	3.8	4.5	7.6	9.3	8.7	7.1	7.0	6.1	6.9	6.5
	1.37	1.26	1.28	1.28	1.27	1.71	1.64	1.94	2.08	1.84	1.63	1.49	1.51
50	6.3	5.0	4.4	4.5	5.3	8.7	10.5	9.9	8.2	8.1	7.1	7.8	7.5
	1.44	1.36	1.42	1.41	1.35	1.77	1.67	2.00	2.23	1.94	1.74	1.54	1.58
100	7.4	5.9	5.3	5.4	6.3	9.9	11.8	11.3	9.5	9.3	8.3	9.0	8.7
	1.56	1.49	1.55	1.54	1.48	1.90	1.73	2.12	2.44	2.12	1.90	1.64	1.69
200	8.6	7.1	6.5	6.6	7.4	11.4	13.3	12.9	11.3	10.9	9.7	10.3	10.2
	1.52	1.44	1.49	1.48	1.43	1.88	1.75	2.12	2.36	2.06	1.84	1.63	1.70
Freq	6.6	7.4	7.3	5.4	5.8	5.3	8.0	15.3	18.1	8.7	6.4	5.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	2.6	2.3	2.4	3.0	5.1	6.0	5.5	4.5	4.5	4.0	4.4	4.2
	1.29	1.19	1.21	1.19	1.24	1.72	1.66	1.89	2.01	1.76	1.58	1.46	1.47
25	4.4	3.4	3.1	3.2	4.0	6.6	7.8	7.1	5.9	5.9	5.2	5.7	5.5
	1.33	1.24	1.27	1.26	1.29	1.75	1.68	1.92	2.10	1.81	1.63	1.48	1.51
50	5.2	4.2	3.8	3.9	4.8	7.8	9.1	8.4	7.1	7.0	6.2	6.8	6.5
	1.39	1.33	1.38	1.37	1.36	1.80	1.71	1.98	2.22	1.90	1.72	1.52	1.56
100	6.2	5.1	4.6	4.8	5.7	9.1	10.6	9.8	8.4	8.2	7.3	7.9	7.7
	1.50	1.49	1.57	1.55	1.48	1.89	1.75	2.08	2.45	2.05	1.87	1.60	1.66
200	7.3	6.1	5.6	5.9	6.8	10.6	12.1	11.3	10.0	9.7	8.7	9.2	9.1
	1.51	1.45	1.51	1.49	1.48	1.93	1.80	2.12	2.42	2.06	1.87	1.63	1.70
Freq	6.9	7.3	6.9	5.3	5.7	5.6	9.0	16.1	16.7	8.3	5.9	6.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.8	718	5.6	298	4.8	195	3.8	94
25	8.5	914	6.5	459	5.9	337	4.9	200
50	9.0	1081	7.4	616	6.8	480	5.9	317
100	9.6	1327	8.4	834	7.8	669	6.9	475
200	10.4	1706	9.8	1319	9.1	1054	8.1	748

Benbecula

57° 28′ 00″ N 07° 22′ 00″ W	UTM 29 E 597975 m N 6370656 m	6 m a.s.l.

Location on the west coast of the Outer Hebrides. The distances to the sea are W: 750 m and E: 8 km. The area out to about 5 km from the station is characterized by the sea, tidal ponds, dunes, lakes and low round hills. The largest hill is 124 m high and appears in the ESE sector.
The anemometer is placed south of Benbecula Aerodrome with the airport buildings appearing in the WSW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	750	0.001										
30	0.03	2000	0.001	5000	0.10								
60	0.03	1000	0.001	5000	0.10								
90	0.03	750	0.01	12500	0.00								
120	0.03	300	0.10	600	0.05	10000	0.00						
150	0.03	300	0.10	600	0.05								
180	0.03	125	0.10	250	0.05								
210	0.03	125	0.10	250	0.05	4000	0.00						
240	0.03	200	0.40	500	0.05	2500	0.00						
270	0.05	500	0.10	1500	0.03	2500	0.00						
300	0.03	750	0.00										
330	0.03	750	0.00										

Height of anemometer: 10.0 m a.g.l. Period: 70010100-81123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.2	53	41	88	107	115	108	118	95	66	106	62	22	11	5	7.1	1.92
30	5.5	70	53	123	134	121	107	120	79	60	76	40	10	4	2	6.1	1.85
60	6.2	68	64	82	105	100	115	115	106	67	107	45	18	3	3	6.8	2.06
90	4.5	84	98	179	177	151	99	72	36	32	39	24	8	2	1	4.7	1.50
120	4.4	73	79	138	158	117	96	92	64	45	73	39	18	5	3	5.7	1.55
150	11.8	32	38	74	104	93	89	96	91	88	123	84	51	26	10	8.1	1.99
180	12.0	30	39	63	84	80	88	114	102	92	142	90	44	21	12	8.3	2.13
210	13.1	25	27	48	76	97	114	137	136	91	125	77	31	10	5	8.0	2.30
240	10.9	28	26	49	83	96	125	141	118	87	126	72	30	12	7	7.8	2.10
270	10.4	29	20	44	68	80	105	120	95	93	152	95	49	26	22	8.8	2.08
300	8.0	34	27	58	87	88	106	105	76	74	127	94	61	31	32	8.6	1.83
330	6.1	57	25	48	75	95	106	121	92	81	129	84	48	22	15	8.1	1.94
Total	100.0	42	39	72	96	98	105	116	97	79	119	73	36	16	11	7.7	1.94

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.8	6.8	6.5	5.3	5.2	5.5	5.4	4.8	6.4	7.1	7.7	7.9	6.4
3	7.8	6.6	6.6	5.4	5.1	5.4	5.4	4.8	6.4	7.2	7.7	7.7	6.3
6	7.8	6.6	6.7	5.4	5.4	5.7	5.5	4.8	6.4	7.3	7.8	8.1	6.5
9	7.7	6.8	7.0	6.4	6.6	6.5	6.1	5.7	6.8	7.4	7.8	8.1	6.9
12	8.2	7.4	7.8	6.8	7.0	6.9	6.5	6.2	7.3	8.1	8.2	8.4	7.4
15	8.1	7.5	8.0	6.8	7.1	7.1	6.6	6.2	7.4	7.8	8.1	8.3	7.4
18	7.8	7.0	7.2	6.3	6.4	6.6	6.2	5.7	6.8	7.0	7.5	8.0	6.9
21	7.7	6.8	6.6	5.5	5.4	5.9	5.5	4.8	6.4	7.1	7.5	8.1	6.4
Day	7.9	6.9	7.0	6.0	6.0	6.2	5.9	5.4	6.8	7.4	7.8	8.1	6.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	8.6	9.1	6.3	7.4	11.8	12.3	10.6	10.7	11.2	10.1	9.4	10.2
	2.21	2.15	2.34	1.50	1.49	2.10	2.26	2.21	2.13	2.06	1.87	1.91	1.97
25	9.9	9.4	10.0	6.9	8.1	12.8	13.4	11.6	11.6	12.2	11.0	10.2	11.2
	2.26	2.20	2.40	1.55	1.52	2.12	2.28	2.24	2.16	2.08	1.89	1.95	1.99
50	10.6	10.1	10.7	7.4	8.6	13.6	14.3	12.3	12.4	13.0	11.7	10.9	11.9
	2.32	2.27	2.46	1.59	1.56	2.15	2.31	2.30	2.20	2.12	1.93	2.00	2.03
100	11.4	10.9	11.5	8.0	9.3	14.5	15.2	13.2	13.2	13.8	12.5	11.7	12.7
	2.27	2.21	2.40	1.54	1.53	2.15	2.31	2.27	2.18	2.11	1.91	1.96	2.02
200	12.4	11.9	12.6	8.8	10.0	15.5	16.2	14.2	14.2	14.8	13.4	12.6	13.7
	2.18	2.12	2.30	1.46	1.48	2.11	2.27	2.20	2.13	2.06	1.87	1.90	1.98
Freq	7.0	5.7	6.1	4.7	4.4	10.8	12.0	13.0	11.2	10.5	8.3	6.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.3	6.1	6.3	4.1	6.0	8.7	8.8	7.5	7.7	8.0	7.0	6.5	7.3
	1.91	1.87	1.97	1.24	1.42	2.01	2.11	2.03	1.91	1.88	1.67	1.71	1.79
25	7.5	7.2	7.5	5.0	7.1	10.1	10.3	8.8	9.0	9.4	8.3	7.7	8.6
	2.01	1.98	2.09	1.33	1.47	2.05	2.16	2.10	1.97	1.93	1.72	1.78	1.85
50	8.5	8.3	8.6	5.9	8.0	11.3	11.5	9.9	10.1	10.5	9.3	8.7	9.7
	2.19	2.16	2.28	1.49	1.54	2.12	2.24	2.23	2.07	2.01	1.80	1.90	1.95
100	9.9	9.6	10.0	7.0	9.2	12.6	12.9	11.3	11.5	11.8	10.5	10.0	11.0
	2.35	2.32	2.45	1.58	1.66	2.26	2.39	2.40	2.22	2.15	1.94	2.05	2.10
200	11.9	11.6	12.1	8.7	10.6	14.3	14.6	13.2	13.2	13.5	12.1	11.8	12.8
	2.26	2.23	2.35	1.51	1.61	2.21	2.34	2.32	2.15	2.09	1.88	1.98	2.07
Freq	7.0	5.6	6.0	4.4	5.2	11.8	12.2	12.8	10.9	10.2	7.8	6.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	5.4	5.4	3.7	5.6	7.6	7.6	6.6	6.7	6.9	6.1	5.6	6.4
	1.91	1.90	1.92	1.23	1.48	2.03	2.12	2.03	1.92	1.87	1.68	1.73	1.80
25	6.7	6.6	6.6	4.6	6.8	9.1	9.2	8.0	8.2	8.4	7.4	6.9	7.7
	2.01	1.99	2.02	1.31	1.51	2.07	2.17	2.10	1.97	1.91	1.73	1.79	1.85
50	7.8	7.6	7.7	5.4	7.8	10.4	10.4	9.1	9.4	9.6	8.5	7.9	8.9
	2.16	2.15	2.18	1.44	1.58	2.13	2.24	2.21	2.05	1.98	1.80	1.90	1.94
100	9.1	8.9	9.0	6.5	9.0	11.8	11.9	10.5	10.7	10.9	9.8	9.2	10.2
	2.37	2.37	2.39	1.58	1.70	2.25	2.37	2.41	2.21	2.12	1.95	2.08	2.09
200	10.9	10.8	10.8	8.0	10.4	13.4	13.5	12.2	12.3	12.5	11.3	10.9	11.9
	2.29	2.28	2.31	1.51	1.67	2.25	2.36	2.34	2.17	2.09	1.91	2.02	2.08
Freq	6.8	5.6	5.9	4.4	5.8	11.8	12.3	12.6	10.8	10.0	7.6	6.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.3	4.1	3.0	4.7	6.0	5.9	5.2	5.3	5.4	4.8	4.3	5.0
	1.90	1.93	1.84	1.24	1.55	2.05	2.13	2.02	1.91	1.85	1.70	1.71	1.80
25	5.6	5.6	5.4	4.0	6.1	7.7	7.6	6.7	6.9	7.0	6.2	5.7	6.5
	1.99	2.01	1.93	1.31	1.59	2.09	2.17	2.08	1.96	1.89	1.74	1.77	1.85
50	6.7	6.7	6.4	4.8	7.2	9.1	9.0	7.9	8.2	8.2	7.4	6.8	7.7
	2.11	2.15	2.06	1.40	1.63	2.14	2.23	2.16	2.02	1.94	1.81	1.86	1.92
100	8.0	7.9	7.7	5.9	8.4	10.6	10.4	9.3	9.5	9.6	8.7	8.0	9.1
	2.35	2.39	2.30	1.58	1.73	2.24	2.35	2.32	2.14	2.05	1.93	2.03	2.05
200	9.6	9.5	9.2	7.1	9.8	12.2	12.1	10.9	11.1	11.1	10.1	9.5	10.6
	2.31	2.35	2.25	1.53	1.76	2.29	2.39	2.34	2.18	2.09	1.95	2.02	2.09
Freq	6.6	5.7	5.7	4.4	6.7	11.8	12.4	12.3	10.8	9.7	7.4	6.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	9.1	889	6.5	362	5.7	238	4.5	115
25	9.9	1133	7.6	564	6.9	412	5.8	245
50	10.5	1348	8.6	763	7.9	591	6.8	392
100	11.3	1658	9.8	1041	9.1	831	8.0	591
200	12.2	2119	11.3	1647	10.5	1313	9.4	932

Birmingham

52° 27′ 00″ N	01° 44′ 00″ W	UTM 30	E 586085 m	N 5811966 m	94 m a.s.l.

Location 7 km ESE of the City of Birmingham with the suburbs almost reaching the airport boundary from SW to N. The Welsh hills and the Pennines give high ground in most directions at distances 50-60 km. Closer to the station the terrain is very open in most directions. The station is situated on a grass area on the S side of the airport about 140 m NNE of the terminal building.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	600	0.40										
30	0.01	750	0.40										
60	0.01	500	0.40										
90	0.01	1000	0.40										
120	0.01	500	0.10	3000	0.40								
150	0.01	750	0.10	3000	0.40								
180	0.01	500	0.20										
210	0.01	500	0.40										
240	0.03	1000	0.40										
270	0.01	1500	0.40										
300	0.01	1500	0.40										
330	0.01	750	0.40										

Height of anemometer: 10.0 m a.g.l. Period: 70010100-81043021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	5.4	165	105	166	221	135	88	58	32	13	16	0	1	0	0	4.0	1.83
30	7.9	115	88	145	203	142	124	86	50	27	18	3	0	0	0	4.5	1.91
60	6.7	138	90	139	217	156	99	83	50	14	13	1	0	0	0	4.3	1.98
90	4.1	212	133	167	177	119	82	61	28	12	6	2	0	0	0	3.7	1.70
120	5.7	210	138	157	177	128	75	59	37	11	7	0	1	0	0	3.7	1.70
150	8.9	181	147	165	161	115	92	60	29	21	18	8	1	0	0	3.9	1.53
180	9.4	111	92	135	179	135	115	81	61	34	44	10	3	1	0	4.8	1.72
210	13.6	48	30	72	163	173	159	133	99	56	52	11	3	0	0	5.9	2.36
240	12.6	68	42	87	155	152	145	131	88	58	57	13	3	0	0	5.9	2.24
270	8.1	96	41	73	121	116	116	120	105	72	89	35	13	3	0	6.5	2.11
300	8.7	92	59	83	123	125	123	129	93	58	67	28	14	3	2	6.2	1.97
330	8.8	91	64	114	181	147	129	102	68	42	42	14	3	1	0	5.3	1.91
Total	100.0	113	77	117	169	140	119	99	68	39	41	12	4	1	0	5.1	1.84

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.6	4.1	4.1	3.7	3.4	3.1	3.1	2.8	3.3	3.4	4.6	4.8	3.8
3	4.5	3.9	4.1	3.7	3.2	2.8	2.9	2.6	3.1	3.3	4.4	4.8	3.6
6	4.5	3.9	4.1	3.8	3.3	3.3	3.2	2.6	3.0	3.4	4.4	4.7	3.7
9	4.6	4.1	5.2	5.2	5.0	4.6	4.5	4.1	4.5	4.2	4.6	4.9	4.6
12	5.5	5.3	6.2	5.7	5.6	5.1	5.1	4.8	5.1	5.2	5.9	5.6	5.4
15	5.6	5.3	6.3	5.8	5.6	5.2	5.3	4.7	5.3	5.1	5.8	5.5	5.5
18	4.8	4.3	5.2	5.3	5.2	5.0	5.1	4.3	4.4	3.8	4.8	4.9	4.8
21	4.6	4.1	4.5	3.9	3.9	3.6	3.6	3.2	3.3	3.4	4.5	4.8	4.0
Day	4.8	4.4	4.9	4.6	4.4	4.1	4.1	3.6	4.0	4.0	4.9	5.0	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.2	6.8	7.0	6.3	5.7	5.9	6.9	8.9	9.5	9.5	9.4	8.6	8.0
	2.09	2.23	2.31	2.19	2.01	1.87	1.90	2.48	2.65	2.46	2.30	2.21	2.11
25	7.9	7.5	7.7	6.9	6.3	6.5	7.5	9.7	10.4	10.3	10.2	9.4	8.7
	2.15	2.30	2.39	2.26	2.07	1.92	1.97	2.55	2.72	2.52	2.34	2.27	2.17
50	8.5	8.1	8.2	7.5	6.8	7.0	8.1	10.4	11.1	11.1	10.9	10.0	9.3
	2.21	2.36	2.45	2.32	2.12	1.98	2.02	2.62	2.80	2.59	2.41	2.33	2.22
100	9.2	8.7	8.9	8.1	7.3	7.6	8.8	11.3	12.0	11.9	11.7	10.8	10.1
	2.14	2.29	2.37	2.25	2.06	1.91	1.96	2.55	2.72	2.53	2.35	2.27	2.17
200	10.2	9.6	9.9	8.9	8.1	8.3	9.6	12.4	13.1	13.0	12.8	11.9	11.1
	2.03	2.17	2.25	2.13	1.95	1.81	1.85	2.43	2.60	2.42	2.26	2.17	2.09
Freq	6.8	6.8	7.2	5.2	4.9	7.4	9.3	12.0	13.0	10.1	8.4	8.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.9	4.9	4.2	4.0	4.1	5.0	6.5	6.7	6.7	6.5	5.8	5.6
	1.75	1.91	1.97	1.74	1.67	1.53	1.67	2.26	2.24	2.10	1.97	1.89	1.83
25	5.6	5.9	5.9	5.0	4.8	4.9	6.1	7.8	7.9	8.0	7.7	7.0	6.7
	1.89	2.06	2.13	1.87	1.80	1.65	1.80	2.42	2.38	2.22	2.07	2.02	1.95
50	6.5	6.8	6.8	5.8	5.6	5.7	7.0	8.9	9.1	9.1	8.8	8.0	7.7
	2.12	2.32	2.39	2.11	2.02	1.85	2.02	2.67	2.62	2.41	2.24	2.24	2.13
100	7.8	8.0	8.0	6.9	6.6	6.8	8.4	10.4	10.6	10.5	10.2	9.4	9.0
	2.26	2.47	2.55	2.24	2.15	1.97	2.15	2.86	2.81	2.59	2.41	2.40	2.28
200	9.7	10.0	10.0	8.5	8.2	8.5	10.4	12.8	12.8	12.6	12.2	11.6	11.0
	2.16	2.36	2.43	2.14	2.06	1.88	2.06	2.74	2.69	2.49	2.32	2.30	2.22
Freq	6.0	7.5	6.9	4.6	5.4	8.3	9.4	12.9	12.8	9.0	8.6	8.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.3	4.3	3.5	3.5	3.6	4.5	5.8	5.8	5.9	5.7	5.1	4.9
	1.78	1.92	1.97	1.71	1.67	1.53	1.68	2.30	2.24	2.10	1.96	1.89	1.83
25	4.9	5.3	5.3	4.4	4.3	4.4	5.5	7.1	7.1	7.2	6.9	6.2	6.0
	1.91	2.05	2.11	1.83	1.79	1.64	1.79	2.43	2.36	2.20	2.05	2.01	1.94
50	5.8	6.2	6.2	5.2	5.1	5.2	6.5	8.2	8.3	8.3	8.0	7.3	7.0
	2.11	2.27	2.33	2.03	1.98	1.81	1.99	2.65	2.56	2.37	2.20	2.20	2.10
100	6.9	7.4	7.3	6.1	6.1	6.3	7.8	9.7	9.7	9.7	9.3	8.6	8.3
	2.32	2.50	2.56	2.23	2.17	1.99	2.18	2.92	2.81	2.60	2.42	2.42	2.29
200	8.6	9.2	9.1	7.6	7.5	7.7	9.6	11.7	11.7	11.6	11.1	10.5	10.1
	2.22	2.39	2.45	2.13	2.08	1.90	2.09	2.80	2.70	2.51	2.33	2.32	2.23
Freq	5.7	7.7	6.8	4.4	5.5	8.6	9.4	13.2	12.7	8.6	8.6	8.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.4	3.3	2.7	2.7	2.8	3.6	4.6	4.6	4.6	4.4	3.9	3.8
	1.77	1.89	1.93	1.67	1.66	1.54	1.75	2.33	2.22	2.09	1.95	1.90	1.83
25	4.0	4.4	4.4	3.5	3.6	3.8	4.8	6.0	6.0	6.1	5.8	5.2	5.0
	1.87	2.01	2.05	1.77	1.76	1.63	1.85	2.45	2.33	2.18	2.03	2.01	1.92
50	4.8	5.4	5.3	4.3	4.4	4.6	5.8	7.2	7.2	7.2	6.9	6.2	6.0
	2.03	2.18	2.22	1.93	1.91	1.77	2.01	2.63	2.48	2.31	2.15	2.17	2.05
100	5.8	6.5	6.3	5.2	5.3	5.6	7.0	8.6	8.5	8.6	8.2	7.5	7.2
	2.32	2.48	2.53	2.19	2.17	2.02	2.29	2.96	2.78	2.55	2.38	2.47	2.28
200	7.1	7.9	7.8	6.3	6.5	6.8	8.6	10.3	10.2	10.2	9.8	9.1	8.8
	2.23	2.39	2.44	2.12	2.09	1.95	2.21	2.88	2.72	2.52	2.35	2.38	2.24
Freq	5.5	7.8	6.6	4.2	5.9	8.9	9.5	13.6	12.5	8.1	8.7	8.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.1	389	4.9	155	4.3	102	3.4	49
25	7.7	497	5.9	246	5.3	180	4.4	107
50	8.3	599	6.8	342	6.2	264	5.3	174
100	8.9	772	8.0	525	7.3	404	6.4	273
200	9.8	1062	9.8	987	8.9	745	7.8	490

Blackpool

53° 46′ 00″ N 03° 02′ 00″ W	UTM 30 E 497802 m N 5957689 m	10 m a.s.l.

Location in the urban area of Blackpool 1300 m from the coast of the Irish Sea. High ground occurs in the directions N to SE and SW at distances exceeding 70 km. The immediate surroundings of the airport to the N and S are urban. To the E the surroundings are predominantly rural.
The terrain close to the anemometer is open and flat with the control tower 200 m away to NNW and other buildings more than 500 m away.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	450	0.40										
30	0.03	600	0.40										
60	0.03	600	0.40										
90	0.03	1400	0.40										
120	0.03	1400	0.40										
150	0.03	1200	0.40										
180	0.03	1300	0.40	2500	0.01								
210	0.03	1400	0.00										
240	0.03	1150	0.00										
270	0.03	700	0.10	1400	0.00								
300	0.03	400	0.40	1500	0.00								
330	0.03	400	0.40	2500	0.00								

Height of anemometer: 12.0 m a.g.l. Period: 72110100–82043021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.8	51	90	133	223	156	131	98	64	19	28	6	1	0	0	4.9	2.00
30	4.0	66	117	215	225	151	88	72	35	14	17	0	0	0	0	4.1	1.88
60	5.9	64	95	129	201	147	116	100	55	36	40	13	2	0	0	5.0	1.83
90	10.8	58	101	157	213	147	96	95	52	27	41	11	2	0	0	4.7	1.72
120	9.4	49	68	119	170	155	130	122	82	46	48	11	1	0	0	5.5	2.10
150	10.0	26	32	48	122	166	161	181	114	61	62	21	4	0	0	6.5	2.66
180	4.9	35	32	64	135	146	152	172	121	65	61	12	3	0	1	6.4	2.65
210	6.5	35	33	62	117	113	120	143	115	80	116	43	20	3	1	7.2	2.33
240	12.6	20	21	39	70	69	82	126	138	110	188	94	30	10	3	8.6	2.73
270	13.0	18	24	56	96	107	102	129	116	90	138	72	34	11	6	7.9	2.20
300	11.8	18	29	52	140	153	133	144	109	73	93	33	16	5	2	6.9	2.17
330	7.4	22	28	79	160	160	145	149	107	57	64	19	6	2	0	6.3	2.32
Total	100.0	34	49	86	144	135	119	131	98	64	87	35	13	4	2	6.5	2.06

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.3	5.6	5.6	4.8	4.7	4.8	5.0	4.5	5.9	5.5	6.5	6.1	5.5
3	6.3	5.5	5.6	4.7	4.5	4.6	4.9	4.5	5.8	5.6	6.5	6.2	5.4
6	6.5	5.3	5.6	4.7	4.5	4.9	5.1	4.3	5.9	5.6	6.5	6.2	5.4
9	6.4	5.3	6.0	5.4	5.5	5.3	5.4	5.0	6.3	5.7	6.6	6.4	5.8
12	6.8	6.0	6.4	6.0	5.8	5.8	5.8	5.6	6.7	6.2	6.8	6.7	6.2
15	6.6	5.8	6.4	6.1	5.9	6.0	5.9	5.6	6.7	6.1	6.8	6.5	6.2
18	6.2	5.3	5.8	5.8	5.6	5.6	5.7	5.2	6.1	5.5	6.6	6.4	5.8
21	6.3	5.4	5.7	4.8	4.8	5.0	5.1	4.6	6.0	5.5	6.6	6.3	5.5
Day	6.4	5.5	5.9	5.3	5.2	5.3	5.4	4.9	6.2	5.7	6.6	6.3	5.7

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.4	7.0	7.8	7.5	8.1	9.7	9.3	8.3	9.7	9.5	8.8	8.4	8.7
	2.50	2.17	2.08	2.04	2.32	2.90	3.02	2.35	2.64	2.30	2.15	2.22	2.31
25	9.2	7.7	8.6	8.2	8.9	10.6	10.1	9.1	10.5	10.4	9.6	9.1	9.5
	2.58	2.24	2.15	2.10	2.39	2.98	3.12	2.43	2.70	2.36	2.20	2.29	2.38
50	9.8	8.2	9.2	8.8	9.6	11.3	10.9	9.7	11.3	11.1	10.3	9.8	10.2
	2.65	2.30	2.20	2.15	2.45	3.06	3.20	2.49	2.78	2.42	2.26	2.35	2.44
100	10.7	8.9	10.0	9.6	10.4	12.2	11.8	10.6	12.2	11.9	11.1	10.6	11.0
	2.56	2.23	2.14	2.09	2.38	2.98	3.10	2.42	2.71	2.37	2.20	2.28	2.38
200	11.8	9.9	11.0	10.6	11.5	13.5	13.1	11.7	13.3	13.0	12.2	11.7	12.2
	2.43	2.11	2.03	1.98	2.25	2.84	2.93	2.29	2.59	2.27	2.11	2.16	2.27
Freq	4.6	3.9	5.4	9.5	9.8	9.9	6.2	6.1	11.2	12.8	12.0	8.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.7	5.6	5.1	5.9	7.1	6.2	5.8	6.9	6.6	6.1	5.7	6.1
	1.95	1.87	1.79	1.72	2.08	2.58	2.57	1.91	2.34	1.92	1.82	1.92	1.98
25	6.8	5.7	6.7	6.2	7.1	8.4	7.4	6.9	8.2	7.8	7.2	6.9	7.3
	2.11	2.02	1.92	1.85	2.24	2.76	2.78	2.06	2.48	2.03	1.94	2.07	2.11
50	7.8	6.5	7.8	7.2	8.2	9.6	8.5	8.0	9.4	8.9	8.3	8.0	8.4
	2.37	2.27	2.13	2.08	2.53	3.03	3.12	2.32	2.72	2.19	2.13	2.33	2.33
100	9.3	7.8	9.1	8.5	9.7	11.1	10.1	9.5	10.9	10.3	9.7	9.4	9.8
	2.53	2.41	2.28	2.22	2.69	3.25	3.32	2.47	2.92	2.36	2.29	2.48	2.50
200	11.5	9.6	11.2	10.6	12.1	13.6	12.6	11.8	13.2	12.3	11.8	11.8	12.0
	2.41	2.30	2.19	2.12	2.57	3.12	3.17	2.36	2.80	2.27	2.19	2.37	2.41
Freq	3.8	4.0	5.9	10.8	9.4	10.0	5.0	6.6	12.6	12.9	11.8	7.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	4.2	4.8	4.5	5.3	6.1	5.4	5.2	6.0	5.7	5.3	5.0	5.3
	1.94	1.82	1.78	1.72	2.12	2.56	2.55	1.96	2.29	1.92	1.85	1.91	1.98
25	6.0	5.1	6.0	5.6	6.5	7.5	6.7	6.4	7.3	7.0	6.5	6.2	6.5
	2.08	1.95	1.90	1.83	2.27	2.71	2.73	2.10	2.41	2.02	1.96	2.05	2.10
50	7.0	6.0	7.0	6.6	7.6	8.7	7.8	7.5	8.5	8.1	7.6	7.2	7.6
	2.30	2.15	2.08	2.03	2.51	2.95	3.02	2.31	2.60	2.16	2.13	2.26	2.29
100	8.4	7.2	8.3	7.8	9.0	10.2	9.2	8.9	9.9	9.4	8.9	8.6	9.0
	2.52	2.37	2.29	2.23	2.76	3.24	3.32	2.55	2.86	2.37	2.35	2.49	2.51
200	10.3	8.9	10.1	9.6	11.2	12.4	11.4	10.9	12.0	11.3	10.8	10.6	11.0
	2.42	2.27	2.20	2.13	2.64	3.12	3.17	2.44	2.76	2.29	2.26	2.38	2.43
Freq	3.8	4.1	6.3	10.6	9.4	9.6	5.1	7.1	12.6	12.8	11.4	7.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.3	3.7	3.6	4.3	4.8	4.2	4.2	4.7	4.5	4.1	3.9	4.2
	1.94	1.76	1.77	1.78	2.21	2.57	2.48	2.03	2.28	1.93	1.86	1.89	2.00
25	4.9	4.4	4.9	4.8	5.6	6.3	5.6	5.5	6.2	5.8	5.4	5.2	5.5
	2.06	1.87	1.87	1.89	2.34	2.70	2.63	2.14	2.38	2.01	1.95	2.00	2.10
50	6.0	5.3	5.9	5.8	6.7	7.5	6.7	6.7	7.4	7.0	6.5	6.2	6.6
	2.24	2.03	2.03	2.05	2.54	2.90	2.86	2.31	2.53	2.13	2.09	2.18	2.26
100	7.2	6.4	7.2	7.0	8.1	8.9	8.0	8.0	8.7	8.3	7.8	7.5	7.9
	2.55	2.31	2.31	2.34	2.88	3.27	3.25	2.63	2.82	2.35	2.36	2.48	2.54
200	8.8	7.9	8.7	8.5	9.9	10.8	9.8	9.7	10.5	9.9	9.4	9.2	9.6
	2.45	2.23	2.22	2.25	2.78	3.17	3.13	2.53	2.77	2.32	2.29	2.39	2.47
Freq	3.9	4.4	7.0	10.4	9.4	9.0	5.3	7.8	12.7	12.7	10.8	6.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.7	472	5.4	187	4.7	123	3.7	59
25	8.4	604	6.4	297	5.8	217	4.9	129
50	9.1	730	7.4	414	6.8	320	5.9	210
100	9.8	941	8.7	638	8.0	491	7.0	331
200	10.8	1298	10.7	1203	9.7	909	8.5	598

Bournemouth

50° 47′ 00″ N 01° 50′ 00″ W	UTM 30 E 582248 m N 5626494 m	10 m a.s.l.

Situated 6 km N of the south coast and 2-3 km NE of the nearest outskirts of the city of Bournemouth. The nearest higher ground (180-270 m) is 25-30 km to N and NW. The countryside is characterized by extensive built-up areas SE through N to NE as seen from the station. In the remaining sectors the ground is rather forested.
The anemometer is placed between the runways with nearby buildings in most sectors. Open sectors are 185°-245° and 300°-345°.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.15	1500	0.40								
30	0.01	700	0.40										
60	0.10	800	0.40										
90	0.15	200	0.05	800	0.40								
120	0.15	250	0.05	800	0.40								
150	0.01	200	0.15	400	0.05	1500	0.10	3000	0.40	7000	0.00		
180	0.01	800	0.05	2500	0.40	6500	0.00						
210	0.01	700	0.05	1800	0.40								
240	0.01	800	0.05	3500	0.40							-1	
270	0.01	1500	0.05	3000	0.25							-6	
300	0.01	1000	0.40									-12	
330	0.01	800	0.05	3500	0.25								

Height of anemometer: 13.0 m a.g.l. Period: 70010100-81123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	8.0	196	128	129	152	128	102	67	47	24	23	3	1	0	0	4.2	1.67
30	9.1	135	98	124	178	154	125	83	61	23	16	2	0	0	0	4.6	2.01
60	6.3	197	161	159	190	114	83	51	29	12	5	0	0	0	0	3.6	1.74
90	4.5	228	153	160	187	115	72	46	24	9	4	1	0	0	0	3.5	1.70
120	4.1	240	111	123	160	118	83	81	52	20	10	1	1	0	0	4.0	1.67
150	6.7	152	98	137	203	153	103	63	51	19	15	3	1	0	0	4.3	1.87
180	8.5	117	70	111	158	136	115	84	70	40	64	24	10	2	1	5.4	1.67
210	10.5	85	51	93	120	125	124	114	100	57	80	36	11	3	1	6.3	1.97
240	15.0	67	49	98	152	151	143	120	96	48	52	17	7	1	0	5.8	2.10
270	10.1	124	99	134	179	136	102	90	58	27	38	10	2	2	0	4.7	1.68
300	9.7	135	97	125	151	119	109	100	68	36	43	12	3	2	0	4.9	1.72
330	7.4	215	167	135	145	102	77	60	48	21	20	7	2	0	0	3.8	1.44
Total	100.0	141	98	123	161	132	109	86	65	32	36	12	4	1	0	4.8	1.70

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.1	3.9	3.9	3.4	2.9	2.6	2.5	2.3	2.7	3.1	3.9	4.3	3.3
3	4.1	3.8	3.7	3.3	2.7	2.5	2.4	2.2	2.6	3.0	3.8	4.3	3.2
6	4.1	3.6	3.9	3.4	3.1	3.0	2.7	2.4	2.6	3.1	3.7	4.3	3.3
9	4.2	4.0	5.0	5.2	4.8	4.4	4.3	3.9	4.1	3.8	4.0	4.4	4.3
12	5.3	5.3	6.2	5.8	5.7	5.1	5.0	4.8	5.2	5.3	5.4	5.4	5.4
15	5.4	5.5	6.1	5.9	5.8	5.5	5.4	5.2	5.5	5.1	5.4	5.2	5.5
18	4.4	4.2	5.0	5.2	5.0	4.8	4.8	4.4	4.0	3.5	4.1	4.3	4.5
21	4.2	3.9	4.0	3.5	3.3	3.1	3.1	2.6	2.8	3.1	4.0	4.4	3.5
Day	4.5	4.3	4.7	4.5	4.2	3.9	3.8	3.5	3.7	3.7	4.3	4.6	4.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	6.7	6.4	5.7	6.1	5.9	6.3	8.5	8.6	7.6	7.7	6.6	7.1
	1.82	2.20	2.16	1.97	1.91	1.76	1.65	2.08	2.38	2.18	1.90	1.74	1.92
25	6.6	7.4	7.0	6.3	6.7	6.4	6.9	9.3	9.4	8.3	8.5	7.3	7.8
	1.88	2.27	2.23	2.03	1.97	1.81	1.70	2.13	2.45	2.25	1.95	1.80	1.98
50	7.1	7.9	7.6	6.8	7.2	6.9	7.5	9.9	10.0	8.9	9.1	7.8	8.4
	1.93	2.33	2.29	2.08	2.02	1.86	1.74	2.19	2.51	2.31	2.00	1.85	2.03
100	7.7	8.6	8.2	7.3	7.8	7.5	8.1	10.7	10.9	9.7	9.8	8.4	9.0
	1.87	2.26	2.22	2.02	1.96	1.80	1.69	2.14	2.44	2.24	1.95	1.79	1.97
200	8.5	9.5	9.1	8.1	8.6	8.3	8.9	11.7	12.0	10.7	10.7	9.3	10.0
	1.77	2.14	2.10	1.91	1.85	1.71	1.60	2.05	2.32	2.12	1.87	1.69	1.88
Freq	7.8	8.8	7.3	5.2	4.3	5.7	7.9	9.8	13.3	11.8	9.8	8.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.8	4.3	3.9	4.4	4.0	4.4	6.3	5.8	5.0	5.7	4.0	4.9
	1.59	1.92	1.72	1.64	1.61	1.51	1.38	1.89	2.05	1.72	1.67	1.41	1.64
25	5.3	5.7	5.2	4.7	5.3	4.8	5.4	7.5	7.0	6.0	6.7	4.8	5.9
	1.72	2.07	1.86	1.77	1.73	1.62	1.49	1.99	2.22	1.85	1.76	1.52	1.76
50	6.1	6.6	6.0	5.4	6.1	5.6	6.3	8.5	8.1	7.0	7.7	5.6	6.8
	1.93	2.32	2.09	1.99	1.95	1.82	1.67	2.17	2.49	2.08	1.92	1.71	1.94
100	7.3	7.8	7.1	6.5	7.3	6.7	7.5	9.9	9.6	8.3	9.0	6.7	8.1
	2.05	2.47	2.22	2.11	2.07	1.94	1.78	2.33	2.65	2.22	2.06	1.81	2.07
200	9.0	9.8	8.9	8.1	9.1	8.3	9.3	11.8	11.9	10.3	10.8	8.3	10.0
	1.96	2.36	2.12	2.02	1.98	1.85	1.70	2.24	2.53	2.12	1.99	1.73	2.00
Freq	7.9	9.0	6.6	4.8	4.2	6.4	8.4	10.2	14.5	10.6	9.7	7.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	4.2	3.7	3.4	3.9	3.5	3.9	5.6	5.1	4.3	5.0	3.3	4.3
	1.63	1.97	1.70	1.66	1.64	1.55	1.38	1.94	2.07	1.69	1.70	1.40	1.65
25	4.8	5.2	4.6	4.2	4.8	4.4	4.9	6.8	6.3	5.3	6.2	4.1	5.3
	1.74	2.10	1.82	1.78	1.75	1.66	1.48	2.03	2.21	1.80	1.78	1.50	1.75
50	5.7	6.1	5.4	4.9	5.7	5.2	5.8	7.9	7.3	6.2	7.2	4.9	6.3
	1.92	2.33	2.01	1.97	1.94	1.83	1.63	2.18	2.45	2.00	1.92	1.65	1.91
100	6.8	7.2	6.4	5.9	6.8	6.2	6.9	9.2	8.7	7.4	8.4	5.8	7.4
	2.11	2.56	2.21	2.16	2.13	2.01	1.79	2.39	2.69	2.19	2.11	1.81	2.09
200	8.4	8.9	8.0	7.3	8.4	7.6	8.5	11.0	10.8	9.2	10.1	7.2	9.1
	2.02	2.45	2.12	2.07	2.04	1.93	1.71	2.31	2.58	2.10	2.03	1.74	2.03
Freq	7.9	9.1	6.3	4.6	4.1	6.7	8.5	10.4	14.9	10.2	9.6	7.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.3	2.9	2.7	3.0	2.8	3.2	4.3	3.9	3.4	3.9	2.6	3.4
	1.65	1.95	1.67	1.63	1.64	1.50	1.39	1.94	2.05	1.65	1.67	1.45	1.65
25	4.1	4.3	3.8	3.5	4.0	3.7	4.2	5.7	5.2	4.4	5.1	3.5	4.5
	1.75	2.06	1.76	1.73	1.74	1.59	1.48	2.02	2.17	1.74	1.74	1.53	1.73
50	4.9	5.2	4.6	4.3	4.9	4.5	5.1	6.8	6.3	5.4	6.1	4.2	5.4
	1.90	2.24	1.92	1.87	1.88	1.73	1.60	2.15	2.36	1.89	1.86	1.66	1.86
100	6.0	6.3	5.6	5.2	5.9	5.5	6.3	8.1	7.5	6.5	7.3	5.1	6.5
	2.17	2.56	2.18	2.13	2.15	1.96	1.82	2.38	2.69	2.15	2.07	1.89	2.09
200	7.3	7.7	6.8	6.3	7.2	6.7	7.6	9.7	9.2	7.9	8.7	6.2	7.9
	2.09	2.46	2.10	2.05	2.07	1.89	1.75	2.35	2.59	2.08	2.03	1.82	2.04
Freq	8.1	8.8	6.2	4.5	4.4	7.0	8.6	11.0	14.5	9.9	9.7	7.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.3	305	4.4	126	3.9	83	3.0	40
25	6.9	388	5.3	197	4.7	144	4.0	86
50	7.4	468	6.1	269	5.6	209	4.8	138
100	8.0	610	7.2	417	6.6	320	5.8	215
200	8.8	858	8.9	810	8.1	606	7.0	394

Burrington

50° 56′ 00″ N	03° 59′ 00″ W	UTM 30	E 430898 m	N 5642987 m	201 m a.s.l.

Location in Devon in rather wooded and open terrain. The shortest distance to the W coast is 23 km in the NW direction. The town of Barnstaple is 15 km to the N and the edge of Dartmoor is 25 km due S. Close to the station the terrain is very open in most directions.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	200	0.05	2000	0.15							10	
30	0.03	500	0.05	2000	0.15							10	
60	0.03	500	0.05	2000	0.15							11	
90	0.03	1500	0.05	2000	0.15							11	
120	0.03	750	0.05	2000	0.15							11	
150	0.03	1500	0.05	2000	0.15							10	
180	0.03	1500	0.05	2000	0.15							10	
210	0.03	1000	0.05	4000	0.15							10	
240	0.03	1500	0.05	2000	0.15							11	
270	0.03	1000	0.05	2000	0.15							11	
300	0.03	1000	0.05	2000	0.15							11	
330	0.03	1500	0.05	2000	0.15							10	

Height of anemometer: 10.0 m a.g.l. Period: 77011900–82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.1	24	82	134	197	143	105	98	74	41	61	23	9	3	7	5.5	1.57
30	2.4	30	117	146	189	102	114	107	74	47	52	20	2	0	0	5.3	1.84
60	3.9	35	79	124	178	132	126	94	114	50	56	11	2	0	0	5.6	2.06
90	5.9	19	68	103	157	145	118	129	99	56	64	24	13	4	0	6.1	2.00
120	7.7	18	57	127	185	152	118	93	78	51	64	36	11	5	6	5.8	1.62
150	9.6	15	59	122	182	156	123	124	77	40	63	25	8	3	2	5.8	1.85
180	5.7	28	74	147	205	130	96	116	64	52	64	13	9	2	0	5.4	1.74
210	8.3	18	42	85	137	120	115	130	121	75	109	34	12	4	0	6.9	2.30
240	12.3	12	46	90	157	133	121	114	97	72	102	35	14	4	2	6.6	2.01
270	13.4	10	41	86	135	100	84	112	112	88	134	58	25	11	3	7.6	2.20
300	13.2	11	47	89	117	106	94	129	110	86	117	55	24	13	2	7.4	2.17
330	11.7	15	42	94	139	123	112	129	116	62	87	50	21	8	3	6.9	2.04
Total	100.0	17	55	105	157	127	109	117	99	65	91	38	15	6	2	6.5	1.95

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.1	5.7	6.4	4.9	4.3	4.2	4.1	3.9	4.6	5.0	6.4	6.9	5.2
3	6.1	5.5	6.5	4.9	4.3	4.0	4.3	4.0	4.5	5.1	6.2	7.0	5.2
6	6.2	5.4	6.5	4.9	4.6	4.5	4.4	4.1	4.5	5.0	6.4	7.0	5.3
9	6.2	5.9	7.6	6.1	5.8	5.7	5.7	5.3	5.9	5.8	6.8	6.9	6.1
12	6.9	7.0	8.2	6.9	6.5	6.1	6.2	6.0	6.4	6.7	7.7	7.5	6.8
15	6.5	6.9	7.9	7.1	6.5	6.3	6.4	6.1	6.4	6.2	7.1	6.9	6.7
18	6.1	6.0	6.6	5.9	5.5	5.6	5.5	5.0	4.9	5.3	6.7	6.8	5.8
21	6.2	6.1	6.2	5.0	4.3	4.6	4.2	4.0	4.8	5.2	6.7	6.7	5.3
Day	6.3	6.1	7.0	5.7	5.2	5.1	5.1	4.8	5.2	5.5	6.7	6.9	5.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.6	7.6	7.7	8.3	8.1	8.1	7.8	8.9	9.1	9.8	10.1	9.6	8.9
	2.03	1.98	2.40	2.38	1.97	2.09	2.15	2.50	2.41	2.40	2.46	2.35	2.23
25	9.4	8.4	8.5	9.1	8.9	8.8	8.5	9.8	10.0	10.7	11.0	10.5	9.8
	2.07	2.03	2.47	2.45	2.01	2.15	2.22	2.57	2.47	2.44	2.51	2.40	2.28
50	10.0	9.0	9.1	9.7	9.5	9.4	9.1	10.5	10.7	11.4	11.7	11.2	10.5
	2.13	2.09	2.54	2.52	2.07	2.20	2.28	2.64	2.54	2.51	2.58	2.47	2.35
100	10.8	9.7	9.9	10.6	10.3	10.2	9.9	11.3	11.5	12.3	12.6	12.1	11.3
	2.08	2.03	2.46	2.44	2.02	2.14	2.20	2.56	2.47	2.46	2.52	2.42	2.29
200	11.8	10.6	10.9	11.7	11.2	11.2	10.9	12.5	12.6	13.4	13.7	13.1	12.3
	2.00	1.93	2.33	2.31	1.94	2.04	2.09	2.44	2.37	2.37	2.44	2.33	2.21
Freq	8.0	3.8	3.4	5.2	7.0	8.9	7.1	7.6	10.9	12.9	13.1	12.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	5.2	5.4	5.8	5.6	5.6	5.3	6.5	6.4	7.2	7.1	6.7	6.3
	1.64	1.76	2.03	1.98	1.64	1.81	1.77	2.21	2.02	2.15	2.16	2.02	1.93
25	6.8	6.3	6.5	7.0	6.7	6.7	6.4	7.7	7.6	8.4	8.4	7.9	7.5
	1.73	1.90	2.19	2.13	1.73	1.94	1.91	2.36	2.14	2.26	2.27	2.12	2.04
50	7.7	7.3	7.5	8.1	7.7	7.7	7.4	8.8	8.7	9.6	9.5	9.0	8.5
	1.88	2.13	2.46	2.38	1.88	2.16	2.15	2.61	2.34	2.42	2.44	2.29	2.22
100	9.0	8.6	8.9	9.5	8.9	9.1	8.8	10.4	10.1	11.0	10.9	10.4	9.9
	2.02	2.27	2.62	2.54	2.02	2.31	2.29	2.79	2.51	2.60	2.62	2.46	2.39
200	10.8	10.7	11.1	11.8	10.7	11.2	10.9	12.6	12.2	13.0	13.0	12.4	12.0
	1.94	2.17	2.51	2.43	1.94	2.21	2.18	2.67	2.42	2.51	2.53	2.37	2.32
Freq	6.7	2.8	3.7	5.6	7.4	9.4	6.2	8.1	11.8	13.1	13.1	11.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	4.5	4.7	5.1	4.9	4.9	4.6	5.7	5.5	6.3	6.2	5.8	5.5
	1.61	1.81	2.04	1.99	1.63	1.85	1.76	2.27	2.01	2.19	2.17	2.02	1.94
25	6.0	5.6	5.8	6.3	6.0	6.0	5.7	7.0	6.8	7.7	7.6	7.1	6.7
	1.69	1.94	2.18	2.12	1.71	1.98	1.88	2.41	2.11	2.28	2.26	2.12	2.04
50	6.9	6.5	6.8	7.4	7.0	7.1	6.7	8.2	7.9	8.8	8.7	8.2	7.8
	1.82	2.15	2.41	2.35	1.84	2.18	2.09	2.62	2.28	2.42	2.40	2.26	2.20
100	8.1	7.8	8.1	8.8	8.2	8.4	7.9	9.6	9.2	10.2	10.1	9.6	9.1
	1.99	2.36	2.65	2.58	2.02	2.40	2.30	2.88	2.51	2.65	2.63	2.48	2.42
200	9.7	9.6	10.0	10.8	9.8	10.3	9.8	11.7	11.1	12.1	11.9	11.4	11.0
	1.92	2.26	2.54	2.47	1.95	2.30	2.19	2.77	2.42	2.56	2.55	2.40	2.35
Freq	6.2	2.5	3.9	5.8	7.6	9.6	5.8	8.4	12.2	13.2	13.1	11.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.6	3.8	4.0	3.9	3.8	3.8	4.5	4.4	4.9	4.8	4.5	4.3
	1.63	1.85	2.04	1.95	1.67	1.86	1.85	2.23	2.03	2.19	2.16	2.00	1.95
25	5.0	4.7	4.9	5.3	5.1	5.1	5.0	5.9	5.8	6.4	6.3	5.9	5.7
	1.70	1.97	2.16	2.06	1.75	1.97	1.97	2.34	2.12	2.27	2.24	2.08	2.04
50	6.0	5.7	6.0	6.3	6.1	6.1	6.0	7.0	6.9	7.7	7.5	7.1	6.8
	1.81	2.13	2.35	2.22	1.86	2.13	2.13	2.51	2.25	2.39	2.37	2.20	2.17
100	7.2	6.8	7.2	7.6	7.3	7.4	7.2	8.4	8.2	9.0	8.9	8.4	8.1
	2.00	2.43	2.68	2.53	2.07	2.43	2.43	2.83	2.51	2.60	2.59	2.42	2.41
200	8.6	8.4	8.8	9.3	8.7	9.0	8.9	10.1	9.8	10.7	10.5	10.0	9.7
	1.97	2.35	2.58	2.44	2.03	2.34	2.35	2.75	2.46	2.60	2.58	2.40	2.38
Freq	5.8	2.6	4.1	6.0	7.9	9.1	6.1	8.8	12.3	13.2	12.9	11.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	525	5.6	210	4.9	138	3.8	67
25	8.6	671	6.6	331	6.0	242	5.0	144
50	9.3	806	7.6	458	6.9	353	6.0	233
100	10.0	1026	8.8	680	8.1	528	7.1	362
200	10.9	1387	10.6	1225	9.8	941	8.6	632

Cairngorm

57° 13′ 00″ N 03° 39′ 00″ W	UTM 30 E 460742 m N 6341834 m	1065 m a.s.l.

Location in Scotland in the Grampian Mountains. The summit of Cairngorm (1245 m) is 2 km to the S and the Glen More Forest Park is 3 km to NW. There are no trees or bushes, but two small buildings 50 m away in the N sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03											22	-9
30	0.03											22	9
60	0.03											58	14
90	0.03											86	6
120	0.03											86	-6
150	0.03											57	-14
180	0.03											22	-9
210	0.03											22	9
240	0.03											58	14
270	0.03											86	6
300	0.03											86	-6
330	0.03											57	-14

Height of anemometer: 10.0 m a.g.l. Period: 70010118–80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.2	115	44	103	164	148	89	115	89	63	55	10	5	0	0	5.4	1.91
30	2.4	108	48	117	203	123	103	108	71	42	53	13	2	4	6	5.3	1.49
60	2.8	103	34	83	131	134	108	103	83	66	70	47	11	8	20	6.5	1.46
90	3.8	63	29	69	91	88	88	105	82	50	107	110	49	25	45	8.3	1.62
120	6.6	36	12	40	70	65	64	91	87	64	151	126	80	49	66	10.4	2.04
150	10.3	26	9	24	48	48	62	83	87	73	159	143	94	69	74	11.2	2.24
180	10.3	28	9	30	60	56	48	60	74	55	159	137	109	82	91	11.6	2.31
210	10.3	31	14	35	53	51	45	59	62	54	113	121	109	79	177	12.8	2.15
240	14.6	23	16	34	54	47	44	59	57	46	109	119	110	87	196	13.3	2.17
270	20.2	16	14	34	57	56	52	67	73	56	128	125	100	70	151	12.2	1.99
300	10.6	31	21	54	92	83	86	79	76	68	144	85	60	41	79	9.6	1.68
330	4.9	61	22	81	145	124	97	120	104	69	91	45	21	11	8	7.0	1.87
Total	100.0	36	17	44	75	68	63	76	75	58	125	110	83	60	110	10.9	1.83

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	10.2	10.1	11.0	8.0	8.2	7.9	7.1	7.0	10.1	10.2	11.4	12.8	9.4
3	10.2	9.8	10.6	8.2	8.4	7.9	7.4	7.1	10.1	10.0	11.8	12.8	9.5
6	9.9	9.5	10.4	8.3	8.1	7.8	7.4	7.2	9.9	10.2	11.2	13.0	9.3
9	10.4	9.9	11.2	8.9	8.2	7.7	7.2	7.3	9.7	10.3	11.7	12.8	9.5
12	10.5	10.0	11.3	8.9	8.0	7.7	7.0	7.3	9.9	10.5	12.1	13.1	9.6
15	10.5	10.0	11.4	8.7	8.1	8.1	7.3	7.3	9.8	10.5	11.8	13.2	9.7
18	10.3	10.4	11.3	8.5	8.0	8.0	7.2	7.3	9.9	10.3	11.4	12.6	9.5
21	10.0	10.5	11.0	8.3	8.1	8.1	7.1	7.4	10.0	10.4	11.2	12.9	9.5
Day	10.3	10.0	11.0	8.5	8.1	7.9	7.2	7.3	9.9	10.3	11.6	12.9	9.5

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	7.1	6.8	6.6	7.9	9.8	12.7	14.4	12.2	9.9	8.1	7.6	10.5
	2.10	1.87	1.78	1.93	2.35	2.44	2.38	2.30	2.19	2.24	2.04	1.84	1.89
25	8.1	7.8	7.5	7.3	8.6	10.6	13.9	15.7	13.3	10.8	8.9	8.3	11.4
	2.16	1.93	1.84	1.99	2.43	2.49	2.40	2.31	2.22	2.28	2.09	1.88	1.92
50	8.7	8.3	8.0	7.8	9.3	11.4	14.7	16.6	14.1	11.5	9.5	8.9	12.2
	2.22	1.98	1.88	2.05	2.49	2.56	2.44	2.34	2.25	2.34	2.15	1.94	1.95
100	9.4	9.0	8.7	8.5	10.1	12.2	15.7	17.7	15.0	12.3	10.3	9.6	13.0
	2.15	1.92	1.83	1.98	2.41	2.50	2.44	2.35	2.24	2.30	2.09	1.89	1.96
200	10.4	9.9	9.6	9.3	11.1	13.3	16.8	18.8	16.0	13.3	11.2	10.4	14.1
	2.04	1.82	1.73	1.88	2.28	2.41	2.39	2.32	2.20	2.22	2.00	1.81	1.94
Freq	5.1	3.7	3.1	2.7	4.2	7.7	12.9	15.4	15.8	14.3	8.7	6.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	4.8	4.7	4.6	5.7	7.1	9.6	10.7	8.3	6.6	5.3	5.3	7.5
	1.87	1.48	1.52	1.67	2.04	2.18	2.32	2.20	2.11	2.01	1.68	1.56	1.75
25	6.1	5.8	5.7	5.5	6.8	8.4	11.2	12.5	9.7	7.8	6.3	6.3	8.8
	2.01	1.58	1.63	1.80	2.20	2.29	2.37	2.23	2.17	2.12	1.80	1.65	1.81
50	7.0	6.7	6.6	6.4	7.8	9.5	12.5	13.9	10.8	8.9	7.3	7.3	10.0
	2.26	1.76	1.84	2.03	2.47	2.47	2.45	2.28	2.27	2.30	2.01	1.80	1.91
100	8.3	7.9	7.8	7.6	9.3	10.9	13.9	15.4	12.2	10.3	8.6	8.5	11.4
	2.41	1.88	1.96	2.15	2.63	2.65	2.60	2.37	2.43	2.47	2.14	1.94	2.05
200	10.4	9.7	9.7	9.5	11.5	13.0	15.7	17.1	14.0	12.3	10.7	10.2	13.3
	2.30	1.79	1.87	2.06	2.51	2.56	2.55	2.37	2.37	2.37	2.05	1.86	2.10
Freq	4.8	3.2	3.0	2.7	4.6	8.7	14.1	15.7	16.1	13.6	7.1	6.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.2	4.1	4.2	5.1	6.4	8.4	9.1	7.1	5.7	4.6	4.6	6.5
	1.86	1.49	1.52	1.74	2.01	2.12	2.31	2.15	2.10	1.99	1.67	1.59	1.76
25	5.5	5.2	5.1	5.2	6.3	7.8	10.1	11.0	8.6	7.0	5.7	5.7	7.9
	1.99	1.59	1.63	1.87	2.15	2.20	2.35	2.18	2.16	2.08	1.78	1.67	1.81
50	6.4	6.1	6.0	6.1	7.4	8.9	11.5	12.5	9.8	8.1	6.7	6.7	9.1
	2.20	1.74	1.79	2.06	2.38	2.32	2.42	2.22	2.24	2.24	1.95	1.81	1.89
100	7.7	7.3	7.2	7.3	8.8	10.3	13.0	14.0	11.1	9.4	7.9	7.9	10.5
	2.42	1.91	1.98	2.27	2.62	2.54	2.54	2.30	2.42	2.45	2.14	1.99	2.03
200	9.4	8.9	8.8	8.9	10.8	12.1	14.8	15.8	12.9	11.3	9.7	9.5	12.3
	2.31	1.83	1.89	2.17	2.51	2.46	2.55	2.33	2.38	2.37	2.06	1.92	2.08
Freq	4.7	3.3	2.9	2.8	5.0	8.9	14.5	16.0	15.7	13.0	7.0	6.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.3	3.2	3.4	4.2	5.3	6.7	7.0	5.4	4.4	3.6	3.7	5.1
	1.80	1.48	1.52	1.75	2.02	2.09	2.28	2.11	2.06	1.97	1.67	1.63	1.76
25	4.6	4.3	4.2	4.4	5.5	6.8	8.6	9.0	7.0	5.8	4.8	4.8	6.7
	1.91	1.56	1.62	1.86	2.12	2.15	2.31	2.13	2.12	2.05	1.76	1.71	1.80
50	5.5	5.2	5.1	5.4	6.6	8.1	10.1	10.6	8.3	6.9	5.8	5.8	7.9
	2.07	1.68	1.75	2.02	2.29	2.23	2.36	2.17	2.19	2.17	1.89	1.83	1.87
100	6.7	6.3	6.2	6.5	7.9	9.5	11.7	12.2	9.7	8.2	6.9	6.9	9.3
	2.36	1.90	1.99	2.30	2.59	2.38	2.45	2.23	2.32	2.40	2.15	2.05	1.99
200	8.1	7.7	7.6	7.9	9.5	11.1	13.5	13.9	11.3	9.8	8.4	8.4	10.9
	2.28	1.84	1.92	2.21	2.51	2.41	2.51	2.30	2.36	2.37	2.07	2.00	2.06
Freq	4.5	3.2	2.9	3.1	5.5	9.6	14.6	16.1	15.5	12.2	6.9	5.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	9.3	997	6.7	402	5.8	264	4.6	127
25	10.1	1274	7.8	627	7.1	457	5.9	271
50	10.8	1518	8.9	852	8.1	659	7.0	434
100	11.6	1852	10.1	1171	9.3	933	8.2	659
200	12.5	2341	11.8	1809	10.9	1445	9.7	1029

Castle Archdale

54° 28′ 00″ N	07° 42′ 00″ W	UTM 29	E 584260 m	N 6036353 m	66 m a.s.l.

Location in Northern Ireland on the eastern shore of Lower Lough Erne in the Castle Archdale Forest.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	100	0.30	200	0.05	500	0.30					10	
30	0.05	100	0.30	400	0.20							10	
60	0.05	75	0.30	200	0.10							10	
90	0.05	75	0.30	200	0.10							11	
120	0.05	100	0.30	300	0.10							10	
150	0.05	100	0.10									10	
180	0.05	100	0.10									9	
210	0.05	100	0.30	200	0.10							10	
240	0.05	150	0.30									12	
270	0.05	75	0.30	1100	0.00							7	
300	0.05	150	0.30	1100	0.00							6	
330	0.05	75	0.30	200	0.10	500	0.30					11	

Height of anemometer: 16.0 m a.g.l. Period: 71010103–81123115

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.8	174	95	143	176	130	109	100	39	17	12	4	0	0	0	4.3	1.86
30	3.6	205	106	137	184	130	102	55	32	20	22	6	0	0	0	4.1	1.68
60	4.9	193	139	130	181	127	83	61	45	22	17	2	0	0	0	4.0	1.69
90	6.7	175	192	148	173	114	79	53	34	17	10	5	1	0	0	3.7	1.57
120	10.5	148	178	154	167	118	85	71	49	14	15	1	0	0	0	3.9	1.68
150	12.2	97	97	126	182	156	113	103	68	27	22	7	1	0	0	4.8	1.97
180	9.4	102	80	100	161	131	111	113	74	56	51	17	3	0	0	5.4	1.90
210	10.6	88	80	109	153	155	135	120	76	38	32	9	5	0	0	5.3	2.09
240	10.1	89	89	120	180	161	129	116	60	25	22	6	0	0	0	4.9	2.12
270	12.8	100	111	143	184	149	110	93	54	26	24	5	1	0	0	4.6	1.87
300	9.1	119	112	145	191	149	109	89	49	17	15	3	0	0	0	4.4	1.92
330	5.0	165	104	125	186	152	91	83	59	20	12	4	0	0	0	4.3	1.87
Total	100.0	124	113	130	175	141	107	93	56	26	23	6	1	0	0	4.6	1.83

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.1	3.8	3.5	2.6	2.9	2.7	2.7	2.4	3.3	3.8	4.2	4.4	3.4
3	4.1	3.7	3.5	2.6	2.8	2.6	2.5	2.3	3.3	3.6	4.1	4.6	3.3
6	4.1	3.7	3.4	2.7	3.2	3.2	2.9	2.4	3.4	3.5	4.2	4.6	3.5
9	4.4	4.0	4.3	4.0	4.4	4.1	3.9	3.6	4.4	4.1	4.4	4.9	4.2
12	4.7	5.0	5.3	4.5	4.8	4.6	4.4	4.3	5.0	4.9	5.0	5.1	4.8
15	4.6	4.8	5.1	4.7	4.7	4.6	4.5	4.2	4.8	4.4	4.6	4.7	4.6
18	4.0	4.0	3.9	4.0	4.1	4.2	4.1	3.4	3.7	3.7	4.1	4.5	4.0
21	4.1	3.9	3.7	3.2	3.1	3.1	3.0	2.7	3.3	3.7	4.2	4.4	3.5
Day	4.3	4.1	4.1	3.6	3.8	3.7	3.5	3.2	3.9	4.0	4.3	4.7	3.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.2	6.0	5.5	5.1	5.3	6.1	6.9	7.2	7.4	5.9	5.4	6.0	6.2
	2.14	1.98	1.94	1.85	1.90	2.13	2.15	2.32	2.41	1.86	1.87	2.15	2.01
25	6.8	6.6	6.1	5.6	5.8	6.7	7.6	7.8	8.1	6.5	5.9	6.6	6.8
	2.21	2.04	2.00	1.91	1.96	2.19	2.22	2.40	2.48	1.92	1.93	2.22	2.07
50	7.3	7.1	6.5	6.0	6.2	7.2	8.2	8.4	8.7	7.0	6.3	7.1	7.3
	2.27	2.10	2.05	1.96	2.01	2.25	2.28	2.46	2.55	1.97	1.98	2.28	2.12
100	7.9	7.7	7.1	6.5	6.7	7.8	8.9	9.1	9.4	7.6	6.8	7.7	7.9
	2.20	2.03	1.99	1.90	1.95	2.18	2.21	2.38	2.47	1.91	1.92	2.20	2.06
200	8.7	8.5	7.8	7.1	7.4	8.6	9.8	10.1	10.4	8.4	7.5	8.4	8.7
	2.08	1.92	1.88	1.79	1.85	2.06	2.09	2.26	2.34	1.81	1.81	2.09	1.96
Freq	4.9	4.1	4.5	6.0	9.2	11.8	10.5	10.3	10.2	11.9	10.3	6.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.2	3.7	3.5	3.7	4.5	5.0	5.0	5.3	3.9	3.7	4.4	4.3
	1.79	1.62	1.63	1.52	1.62	1.87	1.83	1.99	2.04	1.56	1.60	1.79	1.71
25	5.1	5.0	4.5	4.2	4.4	5.4	6.1	6.0	6.3	4.7	4.5	5.2	5.2
	1.94	1.74	1.76	1.64	1.74	2.02	1.97	2.15	2.20	1.69	1.73	1.93	1.84
50	5.9	5.8	5.2	4.8	5.2	6.2	7.0	6.9	7.3	5.5	5.2	6.1	6.0
	2.18	1.96	1.98	1.84	1.96	2.27	2.22	2.42	2.47	1.89	1.94	2.17	2.05
100	7.0	6.9	6.2	5.8	6.2	7.4	8.3	8.2	8.6	6.5	6.2	7.2	7.1
	2.32	2.08	2.10	1.96	2.08	2.41	2.36	2.58	2.63	2.02	2.06	2.31	2.17
200	8.8	8.6	7.7	7.2	7.7	9.2	10.3	10.2	10.7	8.1	7.7	8.9	8.9
	2.21	1.99	2.01	1.87	1.99	2.30	2.25	2.46	2.51	1.92	1.97	2.20	2.08
Freq	4.9	3.7	4.8	6.5	10.2	12.2	9.8	10.6	10.0	12.7	9.4	5.3	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.7	3.2	3.0	3.3	4.0	4.4	4.3	4.6	3.4	3.2	3.9	3.8
	1.81	1.62	1.60	1.50	1.62	1.91	1.84	2.00	2.01	1.56	1.58	1.82	1.71
25	4.6	4.5	4.0	3.7	4.0	4.9	5.5	5.4	5.6	4.2	4.0	4.8	4.7
	1.94	1.74	1.71	1.60	1.73	2.05	1.97	2.14	2.15	1.67	1.69	1.95	1.83
50	5.4	5.3	4.7	4.4	4.7	5.8	6.4	6.3	6.6	4.9	4.7	5.6	5.5
	2.15	1.92	1.89	1.77	1.91	2.26	2.18	2.37	2.38	1.85	1.87	2.16	2.01
100	6.5	6.4	5.6	5.2	5.7	6.8	7.7	7.5	7.8	5.9	5.6	6.7	6.5
	2.36	2.11	2.08	1.94	2.10	2.49	2.40	2.61	2.62	2.03	2.05	2.37	2.19
200	8.0	7.9	6.9	6.4	7.0	8.5	9.5	9.3	9.7	7.3	6.9	8.3	8.1
	2.26	2.02	1.99	1.86	2.01	2.38	2.29	2.49	2.51	1.94	1.97	2.27	2.10
Freq	4.8	3.7	4.9	6.7	10.5	12.2	9.6	10.6	10.3	12.6	8.9	5.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	2.8	2.5	2.4	2.7	3.2	3.5	3.5	3.5	2.7	2.6	3.0	3.0
	1.81	1.61	1.62	1.54	1.70	1.89	1.86	2.01	1.96	1.60	1.62	1.81	1.73
25	3.9	3.7	3.3	3.2	3.5	4.2	4.6	4.6	4.6	3.5	3.4	4.0	3.9
	1.91	1.71	1.72	1.64	1.80	2.01	1.97	2.13	2.08	1.69	1.72	1.91	1.83
50	4.7	4.5	4.1	3.9	4.3	5.1	5.6	5.5	5.5	4.3	4.2	4.8	4.8
	2.08	1.85	1.87	1.77	1.96	2.18	2.14	2.31	2.26	1.83	1.87	2.08	1.98
100	5.7	5.4	4.9	4.7	5.2	6.1	6.7	6.6	6.6	5.2	5.0	5.8	5.7
	2.37	2.11	2.12	2.02	2.22	2.48	2.44	2.63	2.57	2.09	2.12	2.37	2.23
200	6.9	6.7	6.0	5.7	6.3	7.4	8.2	8.1	8.1	6.3	6.1	7.1	7.0
	2.28	2.03	2.05	1.95	2.15	2.39	2.35	2.54	2.48	2.01	2.05	2.28	2.16
Freq	4.7	3.9	5.2	7.3	10.7	11.8	9.7	10.4	10.7	12.1	8.4	5.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.5	190	3.8	78	3.4	52	2.7	25
25	6.0	242	4.6	124	4.1	91	3.5	54
50	6.4	293	5.3	172	4.9	133	4.2	88
100	7.0	385	6.3	273	5.8	208	5.1	139
200	7.7	547	7.9	546	7.1	406	6.2	261

Coltishall

52° 45′ 00″ N 01° 21′ 00″ E	UTM 31 E 388628 m N 5845860 m	19 m a.s.l.

Location 14 km NNE of Norwich. The distance from the Norfolk coast ranges from NNW: 60 km, NW: 30 km, N to E: 15 km, S: 90 km. The surrounding countryside is predominantly arable farmland though some parts are well wooded.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	700	0.15										
30	0.01	600	0.15										
60	0.03	300	0.15										
90	0.05												
120	0.03	400	0.05	3000	0.15								
150	0.03	400	0.20	1000	0.05	2500	0.20						
180	0.01	500	0.15										
210	0.01	800	0.10										
240	0.01	1200	0.10										
270	0.01	750	0.40	1600	0.15								
300	0.01	600	0.40	2000	0.10								
330	0.01	450	0.15										

Height of anemometer: 10.0 m a.g.l. Period: 71010100-80122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	7.1	109	62	92	145	162	139	137	77	33	33	5	3	1	0	5.4	2.20
30	6.8	116	61	92	145	155	128	138	79	38	39	6	2	1	0	5.4	2.16
60	7.3	109	96	123	209	172	109	90	49	18	19	6	0	0	0	4.6	1.97
90	6.6	144	123	133	193	130	106	66	47	27	26	3	1	0	0	4.3	1.73
120	6.2	153	133	152	180	131	95	81	47	16	12	2	0	0	0	4.1	1.80
150	6.1	142	108	133	161	125	124	87	64	28	20	5	2	0	0	4.6	1.81
180	7.8	104	70	105	156	133	119	108	75	47	65	15	4	0	0	5.5	1.90
210	11.6	76	55	94	155	161	118	115	91	53	60	18	3	2	0	5.7	1.97
240	14.8	57	47	88	139	141	123	123	101	69	75	26	8	1	0	6.2	2.13
270	11.8	72	65	107	166	143	111	124	72	45	64	20	9	2	0	5.6	1.84
300	7.6	102	78	132	169	134	106	112	62	39	42	17	5	3	0	5.1	1.73
330	6.4	132	99	145	161	119	106	97	66	29	37	7	3	1	1	4.7	1.68
Total	100.0	101	77	112	163	144	116	110	73	41	46	13	4	1	0	5.3	1.88

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.8	4.1	4.3	3.9	3.5	2.8	2.7	2.8	3.4	3.5	5.0	5.4	3.8
3	4.8	4.0	4.2	4.0	3.4	2.7	2.7	2.6	3.3	3.5	4.9	5.2	3.8
6	4.8	4.0	4.1	4.0	3.8	3.4	3.3	2.8	3.2	3.5	4.9	5.2	3.9
9	5.0	4.4	5.2	5.6	5.3	4.6	4.7	4.5	4.9	4.5	5.2	5.2	4.9
12	5.8	5.4	6.3	6.1	5.9	5.3	5.3	5.2	5.6	5.6	6.3	6.1	5.8
15	5.6	5.2	6.4	6.0	6.0	5.3	5.3	5.3	5.6	5.2	5.9	5.6	5.6
18	5.0	4.1	5.0	5.1	5.2	4.6	4.5	4.4	3.9	3.7	5.2	5.2	4.7
21	4.9	4.2	4.5	4.0	3.6	3.0	2.9	2.9	3.5	3.7	5.2	5.3	4.0
Day	5.1	4.4	5.0	4.8	4.6	4.0	3.9	3.8	4.2	4.1	5.3	5.4	4.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	8.0	7.7	6.9	6.4	7.0	8.1	8.3	8.7	8.5	8.0	7.5	7.9
	2.40	2.57	2.39	2.17	2.11	2.11	2.21	2.35	2.45	2.26	2.08	2.03	2.22
25	8.5	8.8	8.4	7.6	7.0	7.6	8.8	9.1	9.5	9.3	8.7	8.2	8.6
	2.47	2.65	2.47	2.24	2.17	2.17	2.28	2.42	2.53	2.32	2.13	2.09	2.29
50	9.1	9.4	9.0	8.2	7.5	8.2	9.5	9.8	10.2	10.0	9.4	8.8	9.3
	2.54	2.72	2.53	2.30	2.23	2.23	2.34	2.49	2.60	2.39	2.19	2.14	2.35
100	9.9	10.2	9.8	8.9	8.1	8.9	10.3	10.6	11.0	10.8	10.1	9.5	10.0
	2.46	2.63	2.45	2.23	2.16	2.16	2.27	2.41	2.52	2.32	2.13	2.08	2.28
200	10.9	11.3	10.8	9.8	9.0	9.8	11.3	11.7	12.2	11.9	11.1	10.5	11.1
	2.33	2.49	2.32	2.11	2.05	2.05	2.15	2.28	2.39	2.21	2.03	1.97	2.17
Freq	6.9	6.9	7.0	6.8	6.3	6.2	7.3	10.3	13.7	12.7	9.0	6.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.5	5.6	5.3	4.6	4.4	5.1	5.7	5.7	6.2	5.9	5.4	5.1	5.5
	2.13	2.13	2.00	1.74	1.76	1.81	1.87	1.96	2.11	1.87	1.73	1.70	1.88
25	6.6	6.7	6.3	5.6	5.3	6.1	6.9	6.9	7.3	7.1	6.5	6.1	6.6
	2.30	2.30	2.16	1.87	1.90	1.95	2.01	2.12	2.26	1.99	1.86	1.83	2.02
50	7.6	7.8	7.3	6.4	6.1	7.0	7.9	7.9	8.4	8.1	7.5	7.1	7.6
	2.59	2.59	2.42	2.10	2.14	2.19	2.24	2.38	2.53	2.19	2.07	2.06	2.25
100	9.1	9.2	8.7	7.7	7.3	8.3	9.3	9.4	9.9	9.5	8.9	8.5	9.0
	2.75	2.75	2.58	2.24	2.28	2.34	2.39	2.53	2.70	2.35	2.21	2.19	2.40
200	11.3	11.5	10.8	9.5	9.0	10.4	11.5	11.7	12.3	11.5	10.9	10.5	11.1
	2.63	2.63	2.47	2.14	2.17	2.23	2.29	2.42	2.58	2.25	2.11	2.10	2.30
Freq	7.1	6.8	7.2	6.7	6.2	6.1	7.7	11.3	14.5	12.0	8.0	6.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	4.9	4.6	4.0	3.8	4.4	5.1	5.0	5.4	5.2	4.7	4.4	4.8
	2.19	2.16	1.96	1.76	1.79	1.81	1.89	2.02	2.13	1.87	1.73	1.69	1.90
25	6.0	6.1	5.6	5.0	4.8	5.5	6.2	6.2	6.6	6.3	5.8	5.5	5.9
	2.34	2.31	2.10	1.88	1.92	1.94	2.01	2.16	2.27	1.98	1.84	1.81	2.02
50	7.0	7.1	6.6	5.8	5.6	6.5	7.3	7.3	7.7	7.4	6.8	6.4	7.0
	2.59	2.56	2.32	2.08	2.12	2.14	2.21	2.39	2.49	2.16	2.02	2.00	2.22
100	8.3	8.5	7.9	7.0	6.7	7.7	8.6	8.7	9.2	8.7	8.1	7.7	8.3
	2.85	2.81	2.55	2.29	2.33	2.35	2.43	2.63	2.74	2.37	2.22	2.19	2.44
200	10.3	10.4	9.7	8.6	8.2	9.5	10.5	10.7	11.2	10.6	9.9	9.5	10.1
	2.72	2.69	2.44	2.19	2.23	2.25	2.33	2.52	2.62	2.28	2.13	2.10	2.34
Freq	7.1	6.8	7.2	6.7	6.2	6.1	7.8	11.6	14.8	11.7	7.6	6.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.8	3.6	3.1	3.1	3.6	4.0	4.0	4.2	4.0	3.7	3.5	3.8
	2.21	2.15	1.94	1.73	1.77	1.82	1.92	2.05	2.12	1.88	1.74	1.74	1.91
25	5.0	5.1	4.7	4.1	4.1	4.7	5.2	5.3	5.6	5.3	4.9	4.6	5.0
	2.34	2.28	2.06	1.83	1.88	1.92	2.03	2.17	2.23	1.98	1.84	1.85	2.01
50	6.1	6.1	5.7	5.0	4.9	5.7	6.3	6.4	6.7	6.4	5.9	5.6	6.0
	2.55	2.48	2.24	1.99	2.05	2.09	2.20	2.36	2.40	2.12	1.99	2.01	2.17
100	7.3	7.3	6.8	6.0	5.9	6.9	7.6	7.7	8.0	7.6	7.1	6.8	7.2
	2.90	2.83	2.55	2.26	2.33	2.38	2.50	2.69	2.73	2.40	2.26	2.28	2.46
200	8.9	9.0	8.3	7.3	7.2	8.4	9.2	9.4	9.7	9.2	8.6	8.3	8.8
	2.79	2.72	2.45	2.18	2.24	2.30	2.41	2.59	2.64	2.33	2.18	2.20	2.38
Freq	7.1	6.8	7.3	6.5	6.1	6.3	8.3	12.0	14.4	11.3	7.4	6.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.0	361	4.9	145	4.3	96	3.4	46
25	7.6	461	5.8	230	5.3	168	4.4	100
50	8.2	560	6.7	320	6.2	247	5.3	163
100	8.9	728	8.0	503	7.3	386	6.4	257
200	9.8	1021	9.8	983	9.0	736	7.8	476

Duirinish

57° 32′ 00″ N	05° 41′ 00″ W	UTM 30	E 339349 m	N 6380075 m	18 m a.s.l.

Location on the W coast of Scotland facing Inner Sound and the Island of Skye. The surroundings are characterized by sounds, locks, peninsulas, islands and mountainous terrain rising to heights of 800 m. The station is placed close to the SW-NE running coastline, which is at a distance of 750 m to the N and 500 m to the W.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	750	0.00	5500	0.05							-5	2
30	0.05	750	0.00	1500	0.05	3000	0.00	7000	0.05			-2	2
60	0.05	2000	0.30	4000	0.00	7000	0.05					-1	
90	0.05	1500	0.30	6000	0.05							-4	-3
120	0.05	1500	0.30	5000	0.05							-9	-3
150	0.05											-10	1
180	0.05											-7	3
210	0.05											-2	2
240	0.05	1500	0.00									-1	
270	0.05	500	0.00									-2	-1
300	0.05	500	0.00									-5	-1
330	0.05	750	0.00	4500	0.05							-7	

Height of anemometer: 20.0 m a.g.l. Period: 70010100-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	3.1	92	66	98	114	83	105	94	98	68	98	46	20	14	3	6.7	1.82
30	3.7	91	75	150	180	139	110	96	60	27	45	17	10	0	1	5.0	1.67
60	12.8	37	62	142	219	178	122	100	60	29	33	12	5	2	0	5.1	1.83
90	8.3	59	128	238	204	131	79	74	42	24	15	4	1	0	0	4.1	1.66
120	6.0	85	118	165	176	117	89	75	55	35	47	21	9	7	3	4.8	1.39
150	5.4	62	50	122	185	141	117	115	72	40	57	26	9	2	3	5.6	1.69
180	9.9	34	31	66	100	88	78	108	121	84	131	85	36	24	15	8.3	2.06
210	18.5	13	16	46	78	92	92	131	122	92	146	80	52	24	16	8.5	2.06
240	11.3	35	28	83	120	116	107	115	95	61	114	67	32	15	12	7.4	1.81
270	10.8	36	32	108	154	120	110	103	81	64	93	52	25	15	7	6.7	1.70
300	5.8	53	39	90	133	138	113	129	84	53	83	39	23	14	9	6.7	1.74
330	4.5	65	30	85	116	100	100	133	98	76	101	53	25	15	5	7.2	1.97
Total	100.0	44	49	108	143	120	101	109	87	59	88	48	25	13	8	6.7	1.71

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	6.7	5.8	5.6	5.1	4.8	5.0	4.7	4.2	5.6	6.0	6.9	7.4	5.7
3	6.8	5.8	5.7	5.0	4.9	5.0	4.5	4.0	5.8	6.0	7.1	7.4	5.7
6	6.9	5.9	5.7	5.0	4.7	5.0	4.6	4.2	5.7	5.9	7.0	7.2	5.7
9	6.8	5.9	5.9	5.6	5.5	5.6	4.9	4.6	5.9	5.9	7.0	7.4	5.9
12	7.0	6.2	6.4	5.8	6.0	6.2	5.6	5.1	6.3	6.4	7.1	7.7	6.3
15	7.0	6.2	6.6	6.0	6.3	6.5	5.9	5.5	6.2	6.5	7.0	7.4	6.4
18	6.6	5.8	6.1	5.8	5.9	5.8	5.6	5.2	5.9	6.0	6.6	7.4	6.1
21	6.7	5.8	5.7	5.4	4.8	5.3	4.9	4.4	5.6	6.0	6.5	7.1	5.7
Day	6.8	5.9	6.0	5.5	5.4	5.6	5.1	4.7	5.9	6.1	6.9	7.4	5.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	6.1	6.6	6.2	6.7	8.1	11.1	11.3	8.8	6.8	6.6	8.2	8.2
	2.05	1.85	2.05	1.95	1.54	1.75	2.13	2.19	1.80	1.67	1.68	2.08	1.72
25	8.6	6.7	7.2	6.7	7.4	8.8	12.1	12.3	9.6	7.5	7.2	9.0	9.0
	2.12	1.91	2.12	2.01	1.57	1.78	2.15	2.21	1.83	1.72	1.73	2.13	1.75
50	9.3	7.2	7.8	7.2	7.9	9.4	12.9	13.1	10.3	8.1	7.8	9.6	9.6
	2.17	1.96	2.17	2.06	1.62	1.83	2.19	2.25	1.88	1.77	1.78	2.19	1.79
100	10.0	7.8	8.4	7.8	8.5	10.1	13.8	13.9	11.0	8.7	8.4	10.4	10.4
	2.11	1.90	2.10	2.00	1.58	1.79	2.18	2.24	1.85	1.71	1.72	2.13	1.78
200	11.0	8.6	9.3	8.7	9.2	11.0	14.8	15.0	11.9	9.6	9.3	11.4	11.3
	2.00	1.80	1.99	1.89	1.51	1.73	2.13	2.19	1.78	1.62	1.63	2.04	1.74
Freq	3.5	3.7	10.2	8.8	6.9	6.3	10.0	16.2	11.9	10.6	7.0	5.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.2	4.6	4.1	5.0	6.1	8.2	8.1	5.5	4.5	4.6	6.0	5.8
	1.65	1.61	1.74	1.54	1.37	1.63	2.02	2.01	1.53	1.40	1.41	1.85	1.54
25	6.2	5.0	5.6	5.0	5.9	7.2	9.6	9.4	6.6	5.5	5.5	7.2	6.9
	1.78	1.74	1.87	1.67	1.43	1.71	2.07	2.08	1.62	1.51	1.52	1.97	1.62
50	7.2	5.8	6.4	5.8	6.8	8.2	10.8	10.6	7.6	6.4	6.5	8.2	7.9
	2.00	1.95	2.11	1.87	1.54	1.82	2.16	2.17	1.76	1.69	1.71	2.16	1.74
100	8.6	6.9	7.7	6.9	7.9	9.4	12.1	11.9	8.9	7.6	7.7	9.6	9.2
	2.13	2.08	2.24	1.99	1.65	1.96	2.31	2.32	1.89	1.80	1.81	2.31	1.87
200	10.7	8.6	9.5	8.6	9.4	11.1	13.9	13.7	10.7	9.4	9.6	11.6	10.9
	2.03	1.98	2.14	1.90	1.60	1.89	2.26	2.26	1.82	1.72	1.73	2.22	1.87
Freq	3.2	4.2	11.6	8.1	6.5	6.4	11.2	17.2	10.7	10.2	6.0	4.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	3.7	4.0	3.7	4.4	5.6	7.2	6.9	4.7	4.0	4.1	5.2	5.1
	1.62	1.67	1.73	1.56	1.38	1.67	2.02	2.01	1.51	1.40	1.43	1.83	1.56
25	5.5	4.6	5.0	4.6	5.4	6.8	8.6	8.4	5.8	4.9	5.1	6.4	6.2
	1.74	1.78	1.85	1.67	1.45	1.73	2.07	2.06	1.58	1.50	1.53	1.93	1.62
50	6.4	5.4	5.8	5.5	6.3	7.8	9.9	9.6	6.8	5.8	6.0	7.4	7.2
	1.92	1.97	2.05	1.85	1.54	1.82	2.15	2.15	1.71	1.65	1.69	2.10	1.72
100	7.7	6.5	7.0	6.5	7.4	9.1	11.2	11.0	8.0	7.0	7.2	8.7	8.5
	2.11	2.17	2.25	2.03	1.69	1.99	2.30	2.31	1.88	1.81	1.85	2.30	1.88
200	9.5	8.0	8.6	8.1	8.8	10.6	12.9	12.6	9.6	8.6	8.9	10.6	10.1
	2.02	2.07	2.15	1.94	1.63	1.93	2.27	2.28	1.81	1.74	1.77	2.22	1.88
Freq	3.3	5.0	11.2	7.9	6.5	6.8	11.8	16.7	10.8	9.8	5.9	4.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.0	3.1	3.0	3.6	4.6	5.6	5.3	3.6	3.1	3.3	4.1	4.0
	1.59	1.70	1.71	1.51	1.44	1.74	2.02	1.99	1.49	1.42	1.44	1.81	1.56
25	4.4	4.0	4.1	4.0	4.7	6.0	7.2	6.9	4.8	4.2	4.4	5.3	5.2
	1.68	1.80	1.81	1.60	1.49	1.79	2.06	2.03	1.55	1.51	1.52	1.90	1.62
50	5.4	4.8	5.0	4.8	5.7	7.2	8.6	8.2	5.8	5.1	5.3	6.4	6.3
	1.83	1.96	1.97	1.73	1.58	1.86	2.13	2.10	1.66	1.63	1.65	2.03	1.71
100	6.5	5.8	6.0	5.8	6.7	8.4	10.0	9.6	6.9	6.2	6.5	7.6	7.5
	2.08	2.22	2.24	1.97	1.73	1.99	2.24	2.23	1.86	1.86	1.88	2.28	1.86
200	7.9	7.1	7.4	7.1	8.0	9.9	11.6	11.1	8.3	7.5	7.9	9.2	8.9
	2.01	2.15	2.16	1.90	1.72	2.01	2.29	2.27	1.81	1.79	1.81	2.22	1.88
Freq	3.4	6.1	10.8	7.7	6.4	7.3	12.6	15.9	10.8	9.2	5.7	4.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.3	548	5.2	227	4.6	150	3.6	72
25	8.0	699	6.2	353	5.6	259	4.7	154
50	8.6	831	7.0	477	6.5	371	5.6	246
100	9.2	1044	8.1	675	7.5	532	6.6	371
200	10.0	1380	9.7	1151	9.0	897	7.9	618

Dustaffnage

56° 28′ 00″ N	05° 26′ 00″ W	UTM 30	E 350082 m	N 6260813 m	3 m a.s.l.

Location on the W coast of Scotland facing the junction of Firth of Lorn and Loch Linnhe. The town of Oban is 3.5 km to the SSW. The surroundings are characterized by sounds, locks, peninsulas, islands and mountainous terrain rising to heights of 700 m. The station is placed near the coast of Dustaffnage Bay and facing E. The coastline runs SW-NE.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.05	150	0.30	500	0.00							-11	4
30	0.05	100	0.01	1250	0.00							-2	5
60	0.01	100	0.00	2500	0.30							4	2
90	0.01	100	0.00	750	0.05							3	-4
120	0.01	100	0.00	500	0.30							-8	-7
150	0.01	500	0.30									-19	-3
180	0.01	400	0.30									-17	6
210	0.01	300	0.30									-4	8
240	0.01	250	0.30	2000	0.01							5	2
270	0.01	200	0.30	750	0.00							3	-4
300	0.01	100	0.05	500	0.00							-6	-5
330	0.03	150	0.10	500	0.00							-13	-2

Height of anemometer: 10.0 m a.g.l. Period: 71070103-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.5	55	77	149	211	200	106	97	54	20	30	3	0	0	0	4.8	2.05
30	3.2	124	155	169	162	115	79	60	51	43	27	13	2	0	0	4.2	1.48
60	7.7	62	149	215	174	106	69	62	47	26	41	33	15	2	0	4.3	1.27
90	13.5	31	65	106	151	151	136	122	96	55	64	18	3	2	0	5.9	2.12
120	7.5	41	46	98	176	195	151	127	73	43	43	5	3	0	0	5.5	2.24
150	8.6	37	41	65	111	139	151	160	131	78	62	19	6	2	0	6.6	2.59
180	8.7	48	94	136	165	172	120	109	75	39	36	3	1	0	0	5.1	2.10
210	15.5	29	61	117	193	173	133	100	76	56	44	12	3	1	1	5.4	1.94
240	11.2	27	31	77	146	166	143	113	92	60	81	36	17	5	6	6.4	1.79
270	10.3	32	38	77	126	131	124	131	109	73	90	36	18	10	3	6.9	2.05
300	6.4	57	68	91	112	93	105	126	111	70	97	43	14	9	4	6.9	2.06
330	2.9	107	95	154	209	134	108	90	50	24	19	7	1	0	1	4.5	1.72
Total	100.0	43	68	113	158	152	125	113	86	53	58	20	8	3	1	5.8	1.89

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.9	5.2	5.1	4.3	3.8	3.6	3.6	3.3	4.7	4.9	5.7	6.3	4.8
3	6.0	5.1	5.3	4.3	3.7	3.3	3.7	3.2	4.7	5.2	5.8	6.3	4.8
6	6.2	4.9	5.1	4.3	3.8	3.7	3.7	3.2	4.6	5.0	5.8	6.4	4.8
9	6.3	5.3	5.5	4.9	4.9	4.5	4.4	3.9	5.2	5.2	5.7	6.4	5.2
12	6.3	5.9	6.2	5.5	5.6	5.3	5.0	4.6	5.5	5.6	6.2	6.6	5.7
15	6.2	5.7	6.3	5.7	5.6	5.5	5.1	4.6	5.6	5.4	6.0	6.6	5.7
18	5.9	5.2	5.5	5.3	5.1	4.7	4.7	4.0	5.0	5.0	5.6	6.4	5.2
21	6.0	5.2	5.2	4.6	4.0	3.8	3.9	3.4	4.7	5.1	5.7	6.3	4.8
Day	6.1	5.3	5.5	4.9	4.6	4.4	4.3	3.8	5.0	5.2	5.8	6.4	5.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.9	5.4	5.3	7.1	8.5	11.6	10.4	9.8	9.4	8.7	8.4	7.1	8.7
	1.92	1.57	1.55	2.37	2.51	2.52	2.30	2.13	2.03	1.98	2.05	1.75	1.95
25	7.6	5.9	5.8	7.7	9.3	12.6	11.4	10.7	10.2	9.5	9.2	7.8	9.5
	1.98	1.62	1.60	2.44	2.59	2.55	2.34	2.17	2.06	2.02	2.10	1.81	1.98
50	8.1	6.4	6.2	8.3	9.9	13.4	12.1	11.4	10.9	10.1	9.9	8.4	10.2
	2.03	1.66	1.64	2.50	2.66	2.61	2.40	2.22	2.12	2.07	2.15	1.85	2.03
100	8.8	6.9	6.7	9.0	10.8	14.3	13.0	12.2	11.7	10.9	10.6	9.1	10.9
	1.97	1.61	1.59	2.42	2.57	2.58	2.36	2.19	2.08	2.03	2.10	1.79	2.01
200	9.7	7.6	7.4	9.9	11.9	15.4	14.0	13.2	12.7	11.9	11.7	10.0	11.9
	1.87	1.52	1.51	2.30	2.44	2.52	2.29	2.12	2.01	1.94	2.00	1.70	1.96
Freq	4.6	3.8	6.0	10.4	9.1	9.9	11.4	13.4	10.2	9.1	7.6	4.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	3.2	3.8	5.1	6.3	8.7	7.1	7.0	6.6	6.0	5.8	4.6	6.1
	1.64	1.20	1.36	2.10	2.17	2.45	2.03	1.88	1.80	1.75	1.73	1.42	1.74
25	5.7	3.9	4.5	6.1	7.5	10.2	8.4	8.2	7.8	7.2	6.9	5.6	7.3
	1.77	1.29	1.46	2.26	2.32	2.53	2.11	1.96	1.87	1.85	1.84	1.53	1.82
50	6.7	4.7	5.3	7.1	8.6	11.4	9.5	9.3	8.8	8.2	8.0	6.5	8.3
	1.99	1.44	1.64	2.55	2.59	2.65	2.25	2.08	2.00	2.02	2.03	1.72	1.96
100	7.9	5.6	6.3	8.4	10.1	12.9	10.9	10.6	10.1	9.6	9.3	7.7	9.7
	2.12	1.53	1.74	2.71	2.76	2.83	2.42	2.24	2.15	2.17	2.18	1.83	2.11
200	9.8	6.9	7.9	10.4	12.5	14.8	12.8	12.3	11.9	11.6	11.4	9.6	11.6
	2.03	1.47	1.67	2.59	2.64	2.76	2.34	2.17	2.08	2.08	2.09	1.75	2.09
Freq	4.8	3.8	6.8	11.0	8.6	10.4	11.9	13.8	9.1	9.0	7.0	3.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	2.8	3.5	4.5	5.7	7.4	6.2	6.1	5.8	5.3	5.0	4.0	5.4
	1.61	1.15	1.45	2.09	2.08	2.39	2.01	1.90	1.85	1.76	1.72	1.44	1.74
25	5.0	3.5	4.3	5.6	6.9	9.0	7.6	7.4	7.1	6.5	6.2	5.0	6.6
	1.72	1.23	1.54	2.24	2.19	2.45	2.09	1.97	1.92	1.86	1.82	1.54	1.82
50	5.9	4.1	5.1	6.6	8.0	10.3	8.7	8.5	8.1	7.5	7.2	5.9	7.6
	1.90	1.35	1.71	2.47	2.37	2.56	2.21	2.08	2.03	2.01	1.98	1.70	1.94
100	7.1	5.0	6.1	7.8	9.4	11.7	10.0	9.8	9.4	8.8	8.5	7.1	8.9
	2.09	1.48	1.87	2.72	2.60	2.76	2.41	2.27	2.22	2.20	2.17	1.87	2.12
200	8.8	6.1	7.5	9.6	11.3	13.6	11.8	11.5	11.1	10.6	10.4	8.8	10.6
	2.00	1.42	1.79	2.60	2.51	2.71	2.34	2.20	2.15	2.12	2.09	1.79	2.09
Freq	4.7	4.1	7.2	10.7	8.7	10.5	12.1	13.3	9.1	8.9	6.7	3.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.2	3.0	3.7	4.7	5.7	4.9	4.8	4.5	4.1	3.9	3.2	4.2
	1.56	1.17	1.61	2.11	2.09	2.31	2.02	1.91	1.87	1.76	1.69	1.48	1.76
25	4.1	3.0	3.9	4.8	6.1	7.4	6.3	6.2	5.9	5.4	5.1	4.2	5.5
	1.65	1.24	1.70	2.24	2.18	2.37	2.08	1.97	1.94	1.85	1.77	1.57	1.82
50	5.0	3.6	4.7	5.8	7.3	8.7	7.6	7.4	7.0	6.5	6.2	5.2	6.6
	1.79	1.34	1.85	2.43	2.30	2.45	2.18	2.05	2.03	1.97	1.90	1.70	1.92
100	6.0	4.5	5.7	7.0	8.6	10.2	8.9	8.7	8.3	7.7	7.4	6.3	7.9
	2.04	1.52	2.10	2.77	2.53	2.61	2.36	2.22	2.22	2.20	2.15	1.94	2.10
200	7.3	5.4	7.0	8.6	10.3	11.9	10.5	10.2	9.8	9.3	8.9	7.6	9.4
	1.96	1.47	2.03	2.67	2.51	2.65	2.37	2.23	2.21	2.15	2.08	1.87	2.11
Freq	4.6	4.5	7.8	10.3	8.8	10.8	12.4	12.8	9.2	8.6	6.2	4.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.7	552	5.5	224	4.8	148	3.8	72
25	8.4	706	6.5	352	5.8	257	4.9	153
50	9.0	843	7.4	480	6.8	372	5.9	247
100	9.7	1062	8.6	695	7.9	542	7.0	378
200	10.6	1412	10.2	1203	9.4	930	8.3	636

Eskdalemuir

55° 19′ 00″ N	03° 12′ 00″ W	UTM 30	E 487306 m	N 6130183 m	249 m a.s.l.

Location in Scotland 80 km S of Edinburgh in the Eskdalemuir Forest - more than 100 km from both the E and W coasts. The countryside is very rugged with many summits reaching heights of 700 m. The station is placed in an opening in the forest extending between 500–750 m in all directions.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03	750	0.30									-1	-3
30	0.03	600	0.30									-7	-3
60	0.03	1500	0.30									-11	-1
90	0.03	1000	0.30									-9	3
120	0.03	1000	0.30									-3	3
150	0.03	750	0.30										1
180	0.03	600	0.30									-1	-3
210	0.03	750	0.30									-7	-3
240	0.03	750	0.30									-11	-1
270	0.03	500	0.30									-8	3
300	0.03	500	0.30									-2	3
330	0.03	500	0.30									1	

Height of anemometer: 10.0 m a.g.l. Period: 70010100-80123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	9.9	138	139	181	192	108	71	66	36	28	24	10	6	1	0	4.0	1.41
30	9.3	106	90	121	179	138	105	88	64	30	50	21	6	1	0	5.0	1.65
60	5.6	168	98	159	213	148	78	62	36	19	17	3	1	0	0	4.1	1.77
90	2.6	323	97	122	184	102	54	54	34	6	19	4	0	0	0	3.5	1.49
120	4.0	278	188	109	135	87	69	53	41	24	16	1	0	0	0	3.3	1.36
150	7.3	188	179	155	163	116	72	59	29	17	18	2	1	0	0	3.7	1.54
180	12.6	90	91	128	171	121	97	84	69	37	54	32	18	5	2	5.3	1.49
210	17.7	48	39	77	135	127	110	118	98	65	96	54	24	8	1	6.9	1.97
240	10.0	79	31	77	125	127	93	104	101	64	97	57	25	16	4	7.0	1.85
270	8.6	105	31	54	113	105	96	108	90	64	103	54	46	20	10	7.3	1.76
300	6.4	151	74	67	118	95	84	90	81	50	93	41	29	10	18	6.4	1.52
330	6.0	212	157	115	116	72	59	72	48	41	47	26	24	8	3	4.4	1.17
Total	100.0	125	89	110	152	116	89	87	68	43	62	32	18	7	3	5.4	1.48

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.3	4.2	4.4	3.9	3.3	3.2	3.0	2.8	4.0	4.2	5.4	5.6	4.1
3	5.1	4.4	4.5	3.9	3.2	3.0	2.6	2.6	4.0	4.1	5.3	5.7	4.0
6	5.4	4.4	4.7	4.3	3.7	3.7	3.4	2.8	4.0	4.2	5.5	5.4	4.3
9	5.4	4.5	5.7	5.8	5.1	5.0	4.6	4.2	5.2	4.8	5.8	5.6	5.1
12	5.9	5.2	6.7	6.1	5.8	5.7	5.1	4.7	5.9	5.7	6.7	6.2	5.8
15	5.6	5.1	6.4	6.2	6.0	5.7	5.4	4.8	5.7	5.2	6.2	6.1	5.7
18	5.2	4.5	5.1	5.0	4.9	5.0	4.6	3.8	4.6	4.5	5.7	5.7	4.9
21	5.2	4.4	4.8	4.3	3.6	3.8	3.4	3.0	4.3	4.3	5.4	5.6	4.4
Day	5.4	4.6	5.3	5.0	4.5	4.4	4.0	3.6	4.7	4.7	5.7	5.8	4.8

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	7.7	7.8	6.9	5.9	5.9	7.8	10.6	11.7	12.3	11.4	8.6	9.2
	1.42	1.67	1.85	1.93	1.68	1.77	1.55	1.89	1.96	1.86	1.70	1.40	1.59
25	7.3	8.4	8.6	7.5	6.5	6.5	8.5	11.6	12.7	13.4	12.4	9.3	10.0
	1.45	1.71	1.90	1.99	1.73	1.83	1.57	1.91	1.98	1.87	1.71	1.42	1.60
50	7.8	9.0	9.2	8.1	7.0	7.0	9.1	12.3	13.5	14.3	13.2	9.9	10.7
	1.49	1.75	1.95	2.05	1.78	1.87	1.61	1.95	2.01	1.89	1.73	1.44	1.63
100	8.3	9.6	9.9	8.8	7.6	7.6	9.8	13.1	14.4	15.1	14.0	10.6	11.4
	1.46	1.72	1.90	1.98	1.73	1.81	1.59	1.94	2.01	1.89	1.73	1.44	1.63
200	9.0	10.4	10.8	9.7	8.4	8.4	10.5	14.0	15.4	16.1	14.9	11.3	12.3
	1.41	1.66	1.83	1.87	1.63	1.72	1.54	1.90	1.98	1.87	1.71	1.41	1.62
Freq	7.5	9.5	7.7	4.4	3.5	5.5	9.6	15.4	14.0	9.9	7.2	5.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	5.8	5.3	4.5	4.0	4.1	5.9	8.0	8.6	9.0	7.8	5.5	6.5
	1.36	1.55	1.65	1.53	1.38	1.51	1.45	1.85	1.82	1.74	1.54	1.22	1.47
25	5.6	6.8	6.3	5.4	4.8	5.0	7.0	9.4	10.1	10.5	9.1	6.4	7.7
	1.44	1.62	1.76	1.65	1.49	1.63	1.50	1.89	1.85	1.77	1.57	1.25	1.51
50	6.4	7.8	7.3	6.3	5.6	5.8	7.9	10.5	11.2	11.7	10.2	7.2	8.7
	1.56	1.74	1.95	1.86	1.67	1.83	1.58	1.97	1.91	1.81	1.61	1.29	1.58
100	7.5	8.9	8.6	7.5	6.7	6.9	9.0	11.8	12.5	13.0	11.4	8.2	9.9
	1.68	1.87	2.08	1.98	1.77	1.94	1.69	2.10	2.01	1.88	1.68	1.38	1.69
200	9.1	10.5	10.5	9.4	8.3	8.5	10.4	13.4	14.1	14.5	12.8	9.3	11.5
	1.61	1.80	2.00	1.89	1.69	1.85	1.64	2.05	1.99	1.88	1.67	1.35	1.71
Freq	8.5	9.5	6.9	3.5	3.9	6.2	10.8	16.8	12.5	9.4	6.6	5.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	5.2	4.5	3.8	3.4	3.6	5.2	7.1	7.6	7.9	6.7	4.6	5.7
	1.37	1.60	1.66	1.49	1.39	1.52	1.47	1.88	1.83	1.74	1.52	1.20	1.47
25	5.0	6.3	5.6	4.8	4.3	4.5	6.4	8.6	9.2	9.5	8.1	5.5	6.9
	1.45	1.66	1.77	1.60	1.48	1.63	1.51	1.93	1.86	1.76	1.54	1.22	1.51
50	5.8	7.3	6.6	5.6	5.1	5.3	7.3	9.8	10.4	10.8	9.2	6.3	8.0
	1.56	1.76	1.94	1.76	1.64	1.80	1.58	1.99	1.91	1.79	1.58	1.26	1.57
100	6.9	8.5	7.8	6.7	6.1	6.3	8.4	11.1	11.8	12.1	10.4	7.3	9.2
	1.72	1.92	2.13	1.94	1.80	1.98	1.71	2.11	1.99	1.86	1.65	1.33	1.68
200	8.3	10.0	9.6	8.3	7.5	7.8	9.8	12.7	13.3	13.7	11.8	8.3	10.7
	1.65	1.87	2.05	1.85	1.72	1.89	1.67	2.10	2.01	1.88	1.66	1.33	1.71
Freq	8.9	9.5	6.6	3.2	4.0	6.4	11.2	17.3	11.9	9.1	6.4	5.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	4.1	3.5	2.8	2.7	2.9	4.3	5.6	6.0	6.2	5.1	3.4	4.5
	1.39	1.64	1.70	1.41	1.37	1.48	1.51	1.93	1.85	1.74	1.48	1.19	1.48
25	4.2	5.4	4.6	3.8	3.5	3.9	5.6	7.3	7.8	8.0	6.5	4.5	5.8
	1.46	1.70	1.80	1.49	1.45	1.57	1.54	1.96	1.87	1.76	1.50	1.21	1.52
50	5.1	6.4	5.6	4.6	4.3	4.7	6.6	8.6	9.2	9.4	7.7	5.3	6.9
	1.56	1.78	1.96	1.62	1.57	1.70	1.60	2.02	1.91	1.79	1.53	1.25	1.57
100	6.1	7.6	6.8	5.6	5.3	5.7	7.7	10.0	10.6	10.8	8.9	6.3	8.2
	1.74	1.94	2.23	1.84	1.79	1.94	1.70	2.12	1.98	1.84	1.58	1.31	1.65
200	7.3	9.0	8.3	6.8	6.4	7.0	9.0	11.6	12.2	12.4	10.3	7.3	9.6
	1.70	1.94	2.15	1.77	1.72	1.87	1.72	2.16	2.03	1.89	1.62	1.33	1.71
Freq	9.1	9.5	6.2	3.0	4.2	6.8	11.8	17.5	11.4	8.8	6.1	5.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.2	858	5.9	356	5.2	234	4.1	112
25	9.0	1094	7.0	551	6.3	402	5.3	238
50	9.6	1293	7.8	737	7.2	572	6.2	378
100	10.2	1576	8.9	985	8.2	791	7.3	566
200	11.0	1989	10.2	1502	9.5	1210	8.5	872

Exeter

50° 44′ 00″ N 03° 25′ 00″ W	UTM 30 E 470594 m N 5620368 m	31 m a.s.l.

Location in an irregular basin formed by the valleys of several rivers. The Dartmoor and Exmoor hills rise to 500 m at a distance of 20-60 km in the SW-W and the NW-N directions respectively. The basin is bounded in all directions other than due S by hills rising to some 300 m at a distance of 5-18 km. The English Channel is 10 km to the S and the edge of the city of Exeter is 4 km to the W. Apart from Exeter the surroundings are almost entirely rural.
The anemometer is situated 3 m above a 9-m high building. There are no buildings obstructing the flow from 210° through N to 80°, but in the remaining sectors there are many airport buildings with an average height of about 10 m.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	750	0.10										
30	0.01	750	0.10										
60	0.01	750	0.10										
90	0.30	400	0.10										
120	0.30	400	0.10										
150	0.30	300	0.10										
180	0.30	300	0.10										
210	0.30	300	0.10										
240	0.10	4000	0.30										
270	0.01	500	0.10	4000	0.30								
300	0.01	800	0.10										
330	0.01	1000	0.10										

Height of anemometer: 12.0 m a.g.l. Period: 70050100–81113021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.2	251	199	96	84	101	92	61	38	17	44	12	3	0	0	3.8	1.30
30	9.1	201	166	70	83	119	102	97	64	23	53	18	2	1	0	4.8	1.65
60	7.2	232	206	73	72	101	84	84	70	19	40	15	4	0	0	4.2	1.41
90	3.6	338	180	80	87	90	89	64	29	7	26	8	2	0	0	3.2	1.21
120	5.5	213	131	95	90	145	106	89	56	24	40	11	1	1	0	4.6	1.72
150	11.2	125	144	132	126	175	106	78	48	16	38	10	2	0	0	4.7	1.83
180	12.3	105	107	124	144	176	120	98	57	18	36	13	1	0	0	4.9	1.96
210	8.2	128	95	90	109	170	119	116	76	25	51	17	2	1	0	5.4	1.98
240	5.8	154	91	68	90	146	127	123	82	28	62	19	6	4	1	5.7	1.91
270	9.1	110	67	63	81	121	103	127	106	37	112	45	15	9	4	6.8	1.94
300	14.6	80	73	79	94	128	119	130	100	31	101	39	15	7	4	6.5	1.91
330	7.2	187	150	112	89	105	75	85	67	25	70	25	8	2	0	4.8	1.46
Total	100.0	156	126	92	100	136	106	100	70	23	60	21	6	2	1	5.2	1.69

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.3	4.1	3.8	3.4	3.1	2.5	2.6	2.3	2.7	3.4	3.8	4.5	3.4
3	4.5	3.9	4.0	3.5	3.0	2.4	2.4	2.2	2.5	3.4	3.7	4.6	3.3
6	4.4	3.9	4.2	3.5	3.1	2.7	2.8	2.2	2.5	3.3	3.8	4.8	3.4
9	4.5	4.1	4.9	5.4	5.2	4.7	4.6	4.0	4.0	3.9	3.9	4.6	4.5
12	5.8	5.8	6.8	6.4	6.2	5.5	5.5	5.2	5.7	5.6	5.6	5.7	5.8
15	5.8	5.9	7.0	6.8	6.3	5.9	6.1	5.7	6.0	5.6	5.8	5.7	6.0
18	4.8	4.7	5.5	5.8	5.5	5.4	5.6	4.9	4.3	3.9	4.3	4.9	5.0
21	4.6	4.1	4.3	3.7	3.4	3.3	3.3	2.6	2.9	3.5	3.8	4.7	3.7
Day	4.8	4.5	5.0	4.8	4.5	4.1	4.1	3.7	3.8	4.1	4.4	4.9	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.9	6.6	6.3	5.6	7.3	7.9	8.1	8.5	8.9	9.7	9.3	7.9	7.9
	1.60	1.84	1.76	1.49	1.82	2.11	2.22	2.23	2.16	2.12	2.15	1.94	1.92
25	6.5	7.2	6.9	6.2	8.0	8.6	8.8	9.3	9.8	10.6	10.1	8.7	8.6
	1.65	1.90	1.82	1.53	1.87	2.17	2.30	2.30	2.21	2.16	2.19	1.98	1.96
50	7.0	7.7	7.5	6.7	8.6	9.2	9.5	9.9	10.4	11.3	10.8	9.3	9.2
	1.70	1.95	1.87	1.58	1.92	2.23	2.35	2.36	2.27	2.22	2.25	2.04	2.01
100	7.6	8.4	8.1	7.2	9.3	10.0	10.3	10.8	11.2	12.1	11.6	10.0	10.0
	1.64	1.88	1.81	1.52	1.87	2.17	2.28	2.29	2.22	2.18	2.20	1.99	1.97
200	8.4	9.2	8.9	7.9	10.2	11.0	11.4	11.8	12.2	13.1	12.6	10.9	10.9
	1.56	1.78	1.71	1.45	1.78	2.05	2.16	2.19	2.13	2.11	2.13	1.90	1.90
Freq	6.5	8.1	7.8	4.9	4.9	9.2	12.0	9.7	6.7	8.0	12.8	9.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.7	4.2	3.8	5.3	5.4	5.7	6.1	6.4	7.0	6.4	4.9	5.5
	1.30	1.60	1.42	1.21	1.63	1.75	1.90	1.95	1.88	1.90	1.88	1.51	1.65
25	4.6	5.6	5.1	4.6	6.4	6.4	6.8	7.3	7.6	8.2	7.6	5.9	6.5
	1.40	1.73	1.52	1.29	1.74	1.89	2.05	2.08	1.98	1.98	1.98	1.62	1.76
50	5.4	6.5	5.9	5.4	7.3	7.5	7.9	8.4	8.6	9.3	8.7	6.9	7.5
	1.57	1.94	1.71	1.44	1.92	2.12	2.30	2.28	2.14	2.10	2.14	1.79	1.92
100	6.4	7.8	7.0	6.4	8.6	8.9	9.3	9.8	9.9	10.6	10.0	8.1	8.8
	1.67	2.07	1.82	1.53	2.05	2.26	2.44	2.45	2.30	2.26	2.30	1.91	2.06
200	8.0	9.6	8.7	7.9	10.5	11.0	11.6	11.9	11.9	12.4	11.9	9.9	10.8
	1.60	1.98	1.74	1.47	1.97	2.16	2.33	2.35	2.22	2.19	2.22	1.83	2.00
Freq	6.3	8.8	7.4	3.9	5.3	10.6	12.2	8.6	6.1	8.9	14.1	7.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	4.1	3.6	3.3	4.8	4.7	5.0	5.4	5.6	6.1	5.6	4.0	4.8
	1.29	1.59	1.39	1.20	1.69	1.80	1.92	1.95	1.88	1.90	1.90	1.43	1.66
25	4.1	5.1	4.5	4.1	5.9	5.8	6.2	6.6	6.8	7.4	6.8	5.0	5.9
	1.38	1.70	1.49	1.27	1.79	1.93	2.06	2.06	1.97	1.97	1.99	1.52	1.75
50	4.8	6.0	5.3	4.9	6.9	6.8	7.2	7.7	7.9	8.5	7.9	5.9	6.9
	1.52	1.88	1.64	1.38	1.95	2.13	2.28	2.23	2.11	2.07	2.13	1.66	1.89
100	5.8	7.1	6.3	5.8	8.1	8.1	8.6	9.0	9.2	9.8	9.2	7.0	8.1
	1.67	2.07	1.80	1.51	2.15	2.35	2.50	2.45	2.31	2.26	2.34	1.83	2.07
200	7.1	8.8	7.8	7.1	9.9	10.1	10.6	10.9	10.9	11.5	11.0	8.6	9.8
	1.60	1.98	1.73	1.46	2.06	2.24	2.40	2.36	2.23	2.20	2.26	1.75	2.02
Freq	6.2	9.1	7.2	3.5	5.5	11.1	12.3	8.3	5.8	9.2	14.6	7.2	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	3.2	2.8	2.8	3.7	3.7	3.9	4.2	4.4	4.7	4.3	3.1	3.8
	1.33	1.57	1.38	1.27	1.69	1.78	1.91	1.93	1.87	1.89	1.88	1.41	1.65
25	3.5	4.2	3.8	3.7	4.9	4.9	5.2	5.6	5.8	6.1	5.7	4.1	4.9
	1.41	1.66	1.46	1.33	1.77	1.89	2.01	2.01	1.94	1.95	1.96	1.49	1.73
50	4.3	5.1	4.6	4.5	5.9	5.9	6.3	6.7	6.9	7.3	6.8	5.0	5.9
	1.53	1.80	1.59	1.43	1.91	2.05	2.18	2.15	2.04	2.04	2.07	1.60	1.85
100	5.2	6.2	5.6	5.4	7.1	7.1	7.5	7.9	8.2	8.6	8.0	6.1	7.1
	1.74	2.05	1.81	1.62	2.17	2.34	2.48	2.40	2.24	2.20	2.28	1.82	2.05
200	6.4	7.5	6.8	6.6	8.5	8.7	9.1	9.5	9.7	10.1	9.6	7.3	8.6
	1.67	1.98	1.74	1.56	2.09	2.26	2.39	2.35	2.22	2.21	2.26	1.76	2.03
Freq	6.6	8.9	6.6	3.8	6.2	11.3	11.8	7.9	6.3	9.9	13.7	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.0	417	4.9	171	4.3	112	3.4	54
25	7.6	531	5.8	267	5.2	195	4.4	116
50	8.2	637	6.7	364	6.1	281	5.3	187
100	8.8	819	7.8	545	7.2	420	6.3	286
200	9.7	1125	9.5	1012	8.7	768	7.6	508

Fort Augustus

57° 08′ 00″ N	04° 43′ 00″ W	UTM 30	E 396090 m	N 6333678 m	42 m a.s.l.

Located in central Scotland in Glen Mor - a valley orientated SW-NE. On either side of the valley mountains rise to over 600 m. The town of Fort Augustus and the SW corner of Loch Ness are about 2 km to the E.
The anemometer is in a clearing surrounded by trees.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.15	100	0.30									-44	29
30	0.15	100	0.30									-18	16
60	0.10	400	0.30									-10	-3
90	0.10	400	0.30									-24	-21
120	0.15	250	0.30									-52	-29
150	0.15	500	0.30									-68	8
180	0.05	500	0.30									-42	27
210	0.15	500	0.30									-18	16
240	0.20	250	0.30									-11	-3
270	0.30											-24	-21
300	0.30											-52	-29
330	0.30											-69	8

Height of anemometer: 16.0 m a.g.l. Period: 70010100-81123112

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	4.3	520	116	101	131	69	41	16	6	1	0	0	0	0	0	1.9	1.12
30	7.8	290	105	123	172	122	89	53	33	8	3	0	0	0	0	3.6	1.73
60	10.0	242	98	126	197	136	102	64	24	8	3	1	0	0	0	3.8	1.94
90	4.6	451	82	130	162	105	50	18	3	1	0	0	0	0	0	2.5	1.44
120	3.1	687	45	56	94	60	27	21	5	3	0	1	0	0	0	1.2	0.79
150	3.3	625	33	42	87	96	54	32	19	10	3	0	0	0	0	1.8	0.94
180	5.3	404	68	78	112	111	80	70	41	16	19	2	0	0	0	3.5	1.40
210	21.3	120	50	74	147	153	157	142	86	39	27	5	1	0	0	5.5	2.43
240	25.1	108	86	135	196	154	112	93	60	29	20	5	2	0	0	4.7	1.89
270	9.0	287	211	214	165	67	27	16	6	4	2	1	0	0	0	2.6	1.52
300	3.3	662	138	86	66	31	12	5	0	0	0	0	0	0	0	1.0	0.87
330	3.0	700	108	80	83	17	9	3	0	0	0	0	0	0	0	0.9	0.83
Total	100.0	275	92	114	158	121	93	73	42	19	13	3	1	0	0	3.9	1.65

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	3.0	2.5	2.6	1.8	2.0	2.0	1.8	1.4	2.3	2.3	2.8	3.2	2.3
3	2.9	2.3	2.5	1.6	1.8	1.8	1.7	1.3	2.1	2.2	2.8	3.1	2.2
6	3.0	2.2	2.4	1.8	2.4	2.9	2.7	1.6	2.1	2.2	2.8	3.2	2.4
9	3.1	2.6	3.6	4.0	4.5	4.6	4.5	3.7	3.9	3.0	3.0	3.2	3.7
12	3.6	3.8	5.1	5.1	5.2	5.3	5.2	4.7	4.9	4.1	3.9	3.9	4.6
15	3.4	3.6	4.9	4.8	5.1	5.3	5.2	4.6	4.8	3.7	3.2	3.4	4.3
18	2.9	2.7	3.4	3.4	3.9	4.2	4.0	3.2	3.1	2.6	2.7	3.2	3.3
21	2.9	2.5	2.8	2.1	2.4	2.6	2.3	1.7	2.4	2.4	2.7	3.0	2.5
Day	3.1	2.8	3.4	3.1	3.4	3.6	3.4	2.8	3.2	2.8	3.0	3.3	3.2

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.6	8.4	7.3	7.6	7.8	10.1	14.2	11.9	9.4	9.6	9.1	7.5	9.9
	1.27	1.63	2.13	2.13	1.46	1.03	1.84	2.11	2.19	1.96	1.69	1.11	1.47
25	9.4	9.1	7.9	8.3	8.5	10.9	15.4	12.9	10.3	10.4	9.9	8.1	10.8
	1.28	1.65	2.20	2.20	1.47	1.03	1.85	2.13	2.23	1.99	1.71	1.11	1.48
50	10.0	9.7	8.5	8.9	9.1	11.6	16.4	13.8	11.0	11.1	10.6	8.7	11.5
	1.29	1.69	2.26	2.25	1.50	1.03	1.86	2.16	2.29	2.03	1.75	1.12	1.50
100	10.6	10.4	9.3	9.7	9.6	12.3	17.3	14.7	11.8	11.9	11.3	9.2	12.3
	1.30	1.67	2.19	2.18	1.49	1.04	1.87	2.15	2.24	2.01	1.73	1.13	1.51
200	11.3	11.2	10.2	10.7	10.4	12.9	18.4	15.7	12.8	12.8	12.1	9.8	13.2
	1.28	1.63	2.07	2.06	1.46	1.03	1.85	2.12	2.17	1.95	1.69	1.12	1.50
Freq	7.6	5.8	4.0	4.3	5.0	6.6	13.9	14.2	10.3	10.6	9.9	7.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.6	5.6	4.9	5.4	5.3	8.1	10.3	7.9	6.5	7.0	6.2	5.2	7.1
	1.35	1.55	1.83	1.76	1.23	1.04	1.99	1.96	1.89	1.76	1.43	0.98	1.38
25	7.7	6.7	5.9	6.4	6.3	9.4	12.0	9.2	7.7	8.2	7.2	6.0	8.3
	1.37	1.62	1.98	1.90	1.26	1.04	2.01	2.01	1.99	1.82	1.47	0.99	1.40
50	8.6	7.6	6.9	7.5	7.1	10.5	13.3	10.4	8.7	9.2	8.1	6.7	9.4
	1.42	1.75	2.22	2.13	1.30	1.05	2.05	2.11	2.14	1.92	1.53	1.00	1.45
100	9.7	8.8	8.2	8.9	8.1	11.5	14.8	11.7	10.1	10.5	9.3	7.5	10.6
	1.49	1.88	2.36	2.27	1.39	1.06	2.13	2.26	2.30	2.06	1.64	1.02	1.53
200	10.9	10.4	10.2	11.0	9.1	12.6	16.4	13.4	12.0	12.1	10.6	8.3	12.1
	1.47	1.81	2.26	2.17	1.36	1.07	2.13	2.20	2.22	2.00	1.60	1.03	1.57
Freq	7.8	5.0	3.9	4.5	5.3	6.9	16.3	12.9	9.9	11.0	9.4	7.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	4.8	4.3	4.8	4.6	7.3	9.0	6.6	5.6	6.1	5.2	4.4	6.2
	1.41	1.63	1.81	1.79	1.19	1.06	2.08	2.00	1.87	1.78	1.38	0.95	1.38
25	7.0	5.9	5.3	5.9	5.6	8.8	10.8	8.0	6.8	7.4	6.3	5.4	7.5
	1.44	1.72	1.94	1.92	1.22	1.06	2.11	2.06	1.96	1.83	1.42	0.96	1.41
50	8.0	6.9	6.2	6.9	6.4	10.0	12.2	9.2	7.9	8.6	7.3	6.1	8.6
	1.48	1.86	2.14	2.12	1.26	1.07	2.15	2.15	2.10	1.92	1.47	0.97	1.45
100	9.2	8.1	7.3	8.2	7.3	11.1	13.8	10.5	9.2	9.8	8.4	6.9	9.8
	1.55	2.04	2.35	2.33	1.33	1.08	2.22	2.34	2.30	2.08	1.57	0.99	1.52
200	10.4	9.8	9.1	10.1	8.4	12.4	15.5	12.2	10.9	11.4	9.6	7.7	11.4
	1.55	1.97	2.25	2.22	1.32	1.09	2.25	2.28	2.22	2.03	1.55	1.01	1.57
Freq	7.9	4.7	3.9	4.6	5.4	7.0	17.1	12.4	9.7	11.2	9.3	6.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	3.7	3.4	3.8	3.5	6.1	6.9	4.9	4.4	4.9	4.0	3.4	4.8
	1.49	1.80	1.82	1.77	1.16	1.12	2.18	2.08	1.86	1.79	1.35	0.93	1.38
25	6.0	4.8	4.4	4.9	4.6	7.9	8.9	6.4	5.7	6.3	5.2	4.4	6.3
	1.52	1.90	1.93	1.88	1.18	1.12	2.21	2.15	1.94	1.84	1.38	0.94	1.41
50	7.1	5.8	5.4	6.0	5.4	9.2	10.5	7.6	6.8	7.5	6.1	5.2	7.4
	1.56	2.07	2.09	2.03	1.21	1.13	2.25	2.25	2.05	1.91	1.42	0.94	1.44
100	8.3	7.1	6.5	7.2	6.4	10.6	12.1	9.0	8.1	8.8	7.2	6.0	8.7
	1.63	2.36	2.38	2.31	1.26	1.13	2.32	2.44	2.25	2.03	1.49	0.95	1.51
200	9.6	8.6	7.9	8.8	7.4	12.0	13.9	10.6	9.6	10.3	8.4	6.9	10.2
	1.67	2.27	2.30	2.23	1.29	1.15	2.38	2.45	2.23	2.06	1.52	0.98	1.56
Freq	8.0	4.2	3.8	4.5	5.8	7.7	18.0	11.4	9.5	10.9	9.6	6.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	9.0	1244	6.5	513	5.6	337	4.4	162
25	9.8	1583	7.6	797	6.8	579	5.7	343
50	10.4	1872	8.5	1067	7.8	827	6.8	544
100	11.1	2250	9.5	1408	8.9	1137	7.9	813
200	11.9	2782	10.9	2029	10.2	1658	9.2	1220

London

51° 28′ 00″ N	00° 28′ 00″ E	UTM 31	E 324030 m	N 5704883 m	24 m a.s.l.

Location in the Thames Valley 20-25 km W of the centre of London. The surrounding area is generally flat. The suburbs of London extend to within a mile or so of the NE, E, and SE sides of the airport but the whole surrounding area has extensive housing. Closer to the airport - to the W and SW - there are clusters of large reservoirs.
The anemometer is placed on the SW corner of the airport surrounded by areas of grass and concrete.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	500	0.10										
30	0.01	500	0.20										
60	0.01	1500	0.15	3000	0.40								
90	0.01	1000	0.10										
120	0.03	250	0.40										
150	0.03	500	0.40										
180	0.03	500	0.05	2500	0.40								
210	0.05	750	0.01	2750	0.40								
240	0.01	500	0.05	4000	0.40								
270	0.01	250	0.10	7000	0.40								
300	0.01	500	0.10	2000	0.40								
330	0.01	500	0.10	2000	0.40								

Height of anemometer: 10.0 m a.g.l. Period: 73040100-82113021

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.1	87	135	191	168	145	110	77	48	15	20	4	1	0	0	4.3	1.81
30	8.1	48	81	163	179	164	139	113	58	30	20	4	0	0	0	5.0	2.19
60	5.6	54	58	120	174	165	143	124	84	40	32	6	1	0	0	5.4	2.25
90	6.1	45	79	157	195	166	111	113	70	32	24	5	1	0	0	5.0	2.04
120	4.9	93	180	251	214	137	64	38	20	3	1	0	0	0	0	3.5	1.95
150	4.8	100	205	245	183	132	60	44	19	7	6	0	0	0	0	3.4	1.72
180	9.0	72	143	197	189	144	91	68	47	22	21	6	0	0	0	4.2	1.72
210	15.3	40	98	170	179	162	115	97	71	30	29	8	1	0	0	4.9	1.94
240	12.4	52	118	176	174	164	131	95	54	18	15	2	0	0	0	4.6	2.11
270	12.6	58	114	197	199	152	102	75	59	20	18	4	0	0	0	4.4	1.83
300	8.6	88	159	190	159	147	89	82	37	16	26	6	1	0	0	4.2	1.70
330	6.6	94	167	192	169	136	87	73	48	19	13	2	0	1	0	4.1	1.72
Total	100.0	64	123	185	182	153	107	86	54	22	20	4	0	0	0	4.5	1.87

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.0	3.8	4.0	3.5	3.3	3.0	3.2	2.8	3.0	3.0	3.7	4.0	3.4
3	4.0	3.6	4.0	3.2	2.9	2.8	2.8	2.4	2.8	3.0	3.7	4.1	3.2
6	4.0	3.6	4.0	3.3	3.1	3.1	3.0	2.5	2.8	3.0	3.7	4.0	3.3
9	4.0	3.9	4.8	4.6	4.3	4.0	4.1	3.6	3.8	3.5	3.9	4.0	4.0
12	5.0	4.7	5.8	5.2	5.1	4.6	4.6	4.2	4.6	4.5	4.9	4.7	4.8
15	5.0	4.8	5.7	5.3	5.4	5.0	4.9	4.6	4.8	4.3	4.9	4.6	4.9
18	4.2	4.3	4.9	5.0	5.1	4.7	4.7	4.3	4.0	3.5	4.0	4.1	4.4
21	4.1	4.1	4.3	3.9	3.9	3.5	3.6	3.3	3.3	3.2	4.0	4.1	3.8
Day	4.3	4.1	4.7	4.3	4.1	3.8	3.9	3.5	3.6	3.5	4.1	4.2	4.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.4	7.2	7.7	7.4	6.7	6.1	6.6	7.4	7.2	7.1	6.9	6.5	7.0
	2.09	2.43	2.60	2.49	2.35	2.15	2.03	2.21	2.38	2.29	2.10	2.01	2.23
25	7.0	7.9	8.4	8.1	7.3	6.6	7.2	8.1	7.9	7.7	7.5	7.1	7.7
	2.16	2.51	2.69	2.57	2.42	2.21	2.09	2.28	2.46	2.36	2.16	2.07	2.30
50	7.5	8.5	9.1	8.7	7.8	7.1	7.8	8.8	8.5	8.3	8.1	7.6	8.2
	2.21	2.57	2.76	2.64	2.49	2.27	2.15	2.35	2.53	2.42	2.22	2.12	2.36
100	8.1	9.2	9.9	9.4	8.5	7.7	8.4	9.5	9.2	9.0	8.8	8.3	8.9
	2.14	2.49	2.67	2.56	2.41	2.20	2.08	2.27	2.44	2.35	2.15	2.06	2.29
200	9.0	10.2	10.9	10.4	9.4	8.5	9.3	10.5	10.2	9.9	9.7	9.1	9.9
	2.03	2.36	2.53	2.42	2.28	2.08	1.97	2.15	2.31	2.22	2.03	1.95	2.17
Freq	6.3	7.3	6.7	5.9	5.2	4.8	7.3	12.8	13.5	12.4	10.2	7.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	5.2	5.5	5.0	4.5	4.2	4.7	5.3	4.9	5.0	4.7	4.5	4.9
	1.77	2.11	2.19	2.06	1.94	1.77	1.71	1.91	2.05	1.89	1.71	1.69	1.88
25	5.3	6.3	6.6	6.0	5.4	5.0	5.6	6.3	5.9	6.0	5.6	5.4	5.9
	1.91	2.28	2.37	2.22	2.10	1.91	1.84	2.06	2.21	2.04	1.85	1.82	2.03
50	6.2	7.2	7.6	6.9	6.3	5.8	6.5	7.3	6.8	6.9	6.5	6.2	6.8
	2.15	2.57	2.67	2.50	2.35	2.15	2.07	2.32	2.49	2.29	2.08	2.05	2.27
100	7.4	8.6	9.0	8.2	7.4	6.9	7.7	8.7	8.1	8.2	7.8	7.4	8.1
	2.28	2.73	2.84	2.66	2.51	2.29	2.20	2.47	2.65	2.44	2.21	2.17	2.41
200	9.1	10.7	11.2	10.3	9.3	8.5	9.6	10.9	10.1	10.2	9.7	9.2	10.0
	2.18	2.61	2.71	2.54	2.40	2.19	2.10	2.36	2.53	2.33	2.11	2.08	2.31
Freq	6.2	7.8	6.0	6.0	4.9	4.8	8.4	14.4	12.9	12.5	9.2	6.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	4.6	4.8	4.3	3.9	3.6	4.1	4.7	4.3	4.3	4.1	3.9	4.3
	1.80	2.14	2.22	2.04	1.95	1.73	1.71	1.92	2.07	1.85	1.70	1.70	1.88
25	4.8	5.7	5.9	5.4	4.9	4.4	5.1	5.7	5.3	5.3	5.0	4.8	5.3
	1.92	2.29	2.38	2.19	2.08	1.85	1.83	2.05	2.22	1.98	1.81	1.81	2.01
50	5.7	6.7	7.0	6.3	5.7	5.2	6.0	6.7	6.2	6.3	5.9	5.7	6.2
	2.13	2.54	2.64	2.42	2.31	2.05	2.03	2.27	2.45	2.19	2.01	2.01	2.21
100	6.8	7.9	8.3	7.5	6.8	6.2	7.1	8.0	7.3	7.5	7.1	6.8	7.4
	2.34	2.79	2.90	2.66	2.54	2.25	2.23	2.49	2.70	2.40	2.20	2.20	2.43
200	8.4	9.8	10.2	9.2	8.4	7.7	8.8	9.9	9.0	9.2	8.7	8.4	9.1
	2.24	2.67	2.77	2.55	2.43	2.15	2.13	2.39	2.58	2.30	2.11	2.11	2.33
Freq	6.2	8.0	5.8	6.1	4.8	4.8	8.8	14.9	12.6	12.5	8.9	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.7	3.8	3.4	3.1	2.9	3.3	3.7	3.3	3.4	3.2	3.1	3.4
	1.84	2.19	2.23	2.01	1.94	1.76	1.72	1.96	2.08	1.82	1.69	1.71	1.88
25	4.1	4.8	5.0	4.5	4.0	3.8	4.3	4.8	4.4	4.5	4.2	4.1	4.4
	1.95	2.32	2.37	2.13	2.06	1.87	1.82	2.07	2.20	1.93	1.79	1.82	1.99
50	5.0	5.8	6.0	5.4	4.9	4.6	5.2	5.8	5.3	5.4	5.1	4.9	5.4
	2.12	2.53	2.57	2.31	2.24	2.03	1.98	2.25	2.39	2.10	1.95	1.98	2.17
100	6.0	7.0	7.2	6.5	5.9	5.5	6.3	7.0	6.4	6.5	6.1	5.9	6.4
	2.41	2.88	2.93	2.63	2.55	2.31	2.26	2.57	2.72	2.39	2.22	2.25	2.46
200	7.4	8.6	8.8	7.9	7.2	6.8	7.7	8.6	7.8	7.9	7.5	7.2	7.9
	2.33	2.77	2.82	2.54	2.45	2.22	2.17	2.47	2.62	2.30	2.13	2.17	2.37
Freq	6.2	7.9	5.7	5.9	4.9	5.1	9.4	15.1	12.3	12.4	8.4	6.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.2	252	4.3	102	3.8	67	3.0	32
25	6.8	322	5.2	162	4.7	119	3.9	70
50	7.3	391	6.0	226	5.5	175	4.7	115
100	7.9	512	7.1	361	6.5	275	5.7	183
200	8.7	724	8.9	719	8.1	535	7.0	342

Lowther Hill

55° 23′ 00″ N 03° 45′ 00″ E	UTM 31 E 547519 m N 6137840 m	727 m a.s.l.

Located in central southern Scotland with the nearest sea being 60 km away to the S and W. The anemometer is situated on a mountain summit, the highest in the area.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03											41	-2
30	0.03											41	3
60	0.03											52	5
90	0.03											62	2
120	0.03											62	-2
150	0.03											51	-5
180	0.03											41	-2
210	0.03											41	3
240	0.03											52	5
270	0.03											62	2
300	0.03											62	-2
330	0.03											51	-5

Height of anemometer: 27.0 m a.g.l. Period: 74010100-82123121

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.8	4	27	39	55	82	90	92	77	93	138	98	65	56	85	10.1	1.76
30	3.8	17	24	51	75	91	88	111	88	72	132	106	88	33	25	9.1	1.94
60	4.8	16	31	59	52	72	56	80	71	87	185	122	82	47	42	10.3	2.27
90	4.8	29	46	60	58	61	78	91	83	62	143	106	76	51	55	9.7	1.93
120	6.9	18	26	57	68	71	79	75	76	63	115	96	92	52	112	10.5	1.78
150	6.8	23	31	43	64	66	72	106	88	60	130	110	84	49	74	10.1	1.87
180	9.3	10	25	45	58	57	68	75	85	72	131	110	86	58	123	11.1	1.76
210	11.9	8	13	27	43	49	53	67	75	64	132	154	104	66	143	12.5	2.17
240	11.9	9	18	36	38	61	64	78	68	66	144	130	107	76	102	11.6	2.14
270	11.3	7	17	33	41	49	59	76	84	64	145	132	106	70	118	11.8	2.04
300	13.1	7	13	30	36	56	51	71	73	56	138	118	99	77	174	12.7	1.88
330	9.7	11	13	23	40	60	65	70	76	63	138	126	107	60	143	12.1	1.98
Total	100.0	12	21	38	49	61	65	79	78	67	138	121	95	62	114	11.4	1.91

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	12.0	10.5	10.2	8.9	8.2	8.1	8.4	8.2	10.6	11.1	11.6	11.9	10.0
3	12.1	10.0	10.2	8.9	8.2	8.1	8.4	8.2	10.5	11.2	11.7	11.5	9.9
6	12.2	9.7	10.4	8.9	7.9	8.0	8.2	8.4	10.5	11.0	11.6	11.8	9.9
9	12.1	9.6	10.3	8.9	8.4	8.3	8.1	8.3	10.6	10.5	11.7	12.0	9.9
12	12.4	9.9	10.7	9.4	8.9	9.0	8.7	8.6	11.4	11.1	12.4	11.8	10.4
15	12.2	10.2	10.9	9.6	8.7	9.2	9.0	8.9	11.4	10.9	11.9	12.0	10.4
18	12.1	10.5	10.6	9.3	8.5	8.9	9.0	8.4	10.9	10.9	11.4	11.9	10.2
21	12.0	10.7	10.4	9.0	8.2	8.4	8.5	8.3	10.7	11.0	11.3	11.7	10.0
Day	12.2	10.1	10.5	9.1	8.4	8.5	8.5	8.4	10.8	11.0	11.7	11.8	10.1

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.9	8.1	7.9	7.3	7.6	7.9	9.1	10.2	9.4	8.7	9.2	9.4	8.9
	1.96	2.06	2.35	2.20	1.96	1.99	1.88	2.22	2.29	2.24	2.03	2.08	2.05
25	9.8	8.9	8.6	8.0	8.3	8.6	9.9	11.1	10.2	9.5	10.0	10.3	9.7
	2.00	2.12	2.43	2.27	2.02	2.05	1.91	2.26	2.34	2.30	2.07	2.12	2.10
50	10.4	9.5	9.3	8.6	8.9	9.2	10.6	11.8	10.9	10.2	10.7	11.0	10.4
	2.06	2.18	2.49	2.33	2.08	2.10	1.96	2.31	2.40	2.36	2.13	2.17	2.15
100	11.2	10.3	10.1	9.3	9.7	10.0	11.3	12.6	11.8	11.0	11.5	11.8	11.2
	2.02	2.12	2.41	2.26	2.01	2.05	1.93	2.28	2.35	2.30	2.09	2.13	2.11
200	12.1	11.3	11.1	10.3	10.7	11.0	12.2	13.7	12.8	12.1	12.4	12.8	12.2
	1.95	2.01	2.28	2.13	1.91	1.94	1.87	2.21	2.26	2.19	2.02	2.06	2.04
Freq	7.7	5.0	4.7	4.4	5.7	6.6	9.3	12.5	12.1	10.5	11.2	10.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.2	5.4	5.5	4.9	5.3	5.5	6.6	7.3	6.4	6.1	6.6	6.8	6.3
	1.70	1.81	2.03	1.76	1.64	1.71	1.69	2.05	2.00	1.90	1.78	1.87	1.80
25	7.3	6.5	6.6	5.9	6.4	6.6	7.8	8.6	7.6	7.2	7.8	8.0	7.4
	1.77	1.96	2.19	1.90	1.76	1.83	1.76	2.13	2.12	2.03	1.86	1.95	1.89
50	8.3	7.5	7.6	6.9	7.4	7.6	8.8	9.8	8.7	8.3	8.8	9.1	8.5
	1.91	2.20	2.46	2.14	1.96	2.04	1.86	2.26	2.32	2.24	1.99	2.08	2.05
100	9.6	8.9	9.1	8.2	8.7	9.0	10.0	11.1	10.1	9.7	10.1	10.4	9.8
	2.05	2.34	2.62	2.28	2.09	2.18	1.99	2.43	2.49	2.39	2.13	2.24	2.21
200	11.4	11.1	11.3	10.1	10.7	11.1	11.7	13.0	12.2	11.8	11.9	12.2	11.8
	1.98	2.23	2.50	2.17	2.00	2.09	1.94	2.35	2.39	2.30	2.06	2.16	2.15
Freq	6.9	4.4	4.8	4.3	6.1	6.8	10.1	13.3	11.8	10.0	11.6	10.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	4.7	4.8	4.3	4.7	4.9	5.8	6.3	5.5	5.3	5.8	5.9	5.5
	1.69	1.85	1.99	1.74	1.67	1.70	1.74	2.04	1.98	1.89	1.81	1.87	1.80
25	6.5	5.8	5.9	5.4	5.8	6.0	7.1	7.7	6.8	6.6	7.0	7.2	6.7
	1.76	1.98	2.13	1.87	1.77	1.79	1.80	2.12	2.08	1.99	1.88	1.95	1.89
50	7.6	6.9	6.9	6.3	6.8	7.1	8.2	8.9	7.9	7.6	8.1	8.3	7.8
	1.88	2.19	2.35	2.06	1.94	1.95	1.89	2.23	2.26	2.16	1.99	2.06	2.02
100	8.8	8.2	8.2	7.5	8.1	8.3	9.4	10.2	9.2	8.9	9.4	9.6	9.1
	2.06	2.40	2.59	2.27	2.13	2.14	2.06	2.44	2.48	2.37	2.17	2.26	2.22
200	10.4	10.1	10.1	9.3	9.9	10.1	11.0	12.0	11.1	10.8	11.0	11.3	10.8
	1.99	2.30	2.47	2.17	2.05	2.06	2.01	2.37	2.39	2.28	2.11	2.19	2.17
Freq	6.7	4.4	4.7	4.4	6.2	7.0	10.4	13.2	11.6	10.1	11.4	9.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.7	3.7	3.4	3.7	4.0	4.7	4.9	4.3	4.2	4.6	4.6	4.3
	1.72	1.89	1.96	1.71	1.69	1.71	1.79	2.03	1.98	1.88	1.83	1.86	1.81
25	5.5	4.9	4.9	4.5	4.9	5.2	6.1	6.4	5.7	5.6	5.9	6.0	5.6
	1.78	2.00	2.08	1.81	1.78	1.78	1.84	2.09	2.07	1.96	1.89	1.92	1.88
50	6.6	5.9	5.9	5.5	5.9	6.3	7.2	7.6	6.8	6.7	7.1	7.1	6.7
	1.88	2.18	2.26	1.97	1.92	1.90	1.92	2.19	2.20	2.09	1.98	2.02	2.00
100	7.8	7.2	7.1	6.7	7.1	7.5	8.5	8.9	8.1	7.9	8.4	8.4	8.0
	2.06	2.48	2.57	2.24	2.18	2.11	2.07	2.37	2.47	2.33	2.15	2.19	2.20
200	9.2	8.8	8.7	8.1	8.6	9.0	10.0	10.6	9.7	9.5	9.9	9.9	9.6
	2.05	2.39	2.48	2.16	2.10	2.07	2.08	2.38	2.42	2.29	2.15	2.19	2.19
Freq	6.4	4.5	4.7	4.7	6.2	7.4	10.8	13.1	11.4	10.3	11.2	9.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	560	5.6	228	4.9	151	3.8	73
25	8.6	714	6.6	357	6.0	261	5.0	156
50	9.2	853	7.5	487	6.9	378	6.0	249
100	9.9	1081	8.7	706	8.0	551	7.1	382
200	10.8	1445	10.4	1240	9.6	957	8.5	651

Manchester

53° 21′ 00″ N 02° 16′ 00″ W	UTM 30 E 548817 m N 5911582 m	70 m a.s.l.

Location about 14 km south of the centre of Manchester and in the middle of a half-basin bounded by the Pennines bearing from 330° through 360° to 150°. These mountains lie 40 km away, reach about 600 m and they give good shelter. Shelter is also provided by the Welsh Mountains 50 to 60 km away to the SW. Winds are channelled through the gap between the Pennines and the Welsh mountains with the result that the most frequent winds come from the south. To the W there is an open exposure to the Irish Sea, which is approximately 50 km away.
Closer to the station extensive housing estates encroach from W through N to SE. Otherwise the surroundings are cultivated farmland. The anemometer is placed between the runways of Manchester Airport (Ringway) with the airport buildings in the W to NW sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	750	0.10	2000	0.40								
30	0.01	500	0.40										
60	0.01	1500	0.10	3000	0.40								
90	0.01	1000	0.10	3500	0.30								
120	0.01	800	0.20										
150	0.01	600	0.20										
180	0.01	750	0.10										
210	0.01	1500	0.10										
240	0.01	400	0.20										
270	0.01	400	0.30										
300	0.01	150	0.30	750	0.20								
330	0.01	500	0.10	4000	0.40								

Height of anemometer: 10.0 m a.g.l. Period: 71010103–80122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.2	202	145	152	170	121	79	62	32	15	15	3	2	1	0	3.8	1.56
30	5.0	112	80	126	167	148	135	111	69	30	22	2	0	0	0	4.9	2.12
60	7.1	105	87	118	152	132	123	100	79	38	47	13	5	0	0	5.2	1.88
90	6.6	123	123	132	152	132	118	81	57	31	35	10	7	1	0	4.8	1.67
120	5.5	132	125	146	170	136	100	76	59	30	23	4	0	0	0	4.4	1.76
150	8.1	99	93	134	201	142	115	82	66	25	37	5	1	0	0	4.7	1.82
180	17.5	64	91	131	187	158	124	101	62	35	35	11	2	0	0	5.0	1.93
210	12.4	74	87	105	147	143	122	127	87	47	45	13	2	1	0	5.5	2.06
240	8.6	103	118	119	125	113	109	106	79	49	59	16	4	0	0	5.3	1.83
270	10.3	89	106	104	131	127	114	101	81	46	65	26	7	1	0	5.6	1.81
300	10.4	71	68	96	149	155	148	126	80	47	45	12	3	1	0	5.6	2.16
330	5.1	149	154	157	173	103	110	64	45	23	15	4	3	1	0	4.1	1.59
Total	100.0	96	100	122	160	138	120	100	70	37	40	11	3	0	0	5.1	1.86

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.9	4.2	4.2	3.8	3.7	3.0	2.9	3.0	3.5	3.7	4.5	4.9	3.8
3	4.7	4.1	4.1	3.5	3.4	2.9	2.7	2.8	3.3	3.7	4.5	4.9	3.7
6	4.8	4.0	4.1	3.6	3.4	3.2	2.9	2.9	3.4	3.8	4.2	4.8	3.8
9	4.9	4.3	4.7	4.8	4.7	4.5	4.0	4.1	4.3	4.2	4.5	4.9	4.5
12	5.6	5.1	6.0	5.6	5.3	5.0	4.8	4.8	5.2	5.3	5.5	5.3	5.3
15	5.4	5.2	6.0	5.8	5.6	5.2	5.2	4.9	5.4	5.1	5.3	5.3	5.4
18	4.9	4.4	5.0	5.4	5.3	4.9	4.7	4.4	4.2	4.0	4.6	5.1	4.7
21	4.8	4.3	4.4	4.0	4.1	3.5	3.3	3.2	3.6	3.9	4.5	5.0	4.0
Day	5.0	4.5	4.8	4.6	4.4	4.0	3.8	3.8	4.1	4.2	4.7	5.0	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	7.3	7.8	7.3	6.8	7.1	7.3	7.5	8.1	8.8	9.8	8.6	7.8
	1.85	2.25	2.31	2.07	2.04	2.15	2.27	2.34	2.22	2.06	2.24	2.07	2.09
25	6.6	8.0	8.6	8.0	7.4	7.7	8.0	8.2	8.9	9.6	10.6	9.4	8.6
	1.90	2.32	2.38	2.14	2.10	2.22	2.34	2.42	2.29	2.10	2.28	2.12	2.14
50	7.1	8.6	9.2	8.6	7.9	8.3	8.6	8.8	9.5	10.3	11.4	10.0	9.2
	1.95	2.38	2.45	2.19	2.16	2.28	2.40	2.48	2.35	2.16	2.35	2.17	2.20
100	7.6	9.3	10.0	9.3	8.6	9.0	9.4	9.6	10.3	11.0	12.2	10.8	9.9
	1.89	2.31	2.37	2.13	2.09	2.20	2.32	2.40	2.28	2.12	2.30	2.12	2.15
200	8.4	10.3	11.1	10.3	9.5	10.0	10.3	10.6	11.4	12.0	13.2	11.8	10.9
	1.79	2.18	2.24	2.01	1.98	2.09	2.20	2.28	2.16	2.04	2.22	2.04	2.06
Freq	4.0	4.3	6.3	6.8	5.9	7.1	13.8	14.5	10.0	9.7	10.4	7.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	5.4	5.4	5.0	4.6	5.0	5.1	5.3	5.8	6.3	7.2	5.1	5.5
	1.54	2.04	1.89	1.69	1.72	1.82	1.92	2.02	1.83	1.81	2.08	1.62	1.79
25	4.9	6.5	6.5	6.0	5.5	6.0	6.1	6.4	6.9	7.4	8.5	6.1	6.5
	1.66	2.20	2.04	1.82	1.85	1.97	2.07	2.18	1.95	1.90	2.17	1.74	1.91
50	5.7	7.5	7.5	6.9	6.4	6.9	7.1	7.4	7.9	8.5	9.6	7.1	7.5
	1.87	2.48	2.29	2.05	2.08	2.21	2.33	2.45	2.16	2.05	2.32	1.94	2.11
100	6.8	8.9	8.9	8.2	7.6	8.3	8.4	8.8	9.3	9.8	11.0	8.4	8.9
	1.98	2.64	2.44	2.18	2.22	2.35	2.48	2.61	2.31	2.20	2.50	2.06	2.27
200	8.4	11.0	11.1	10.2	9.5	10.3	10.4	10.9	11.4	11.6	12.9	10.4	10.9
	1.89	2.52	2.33	2.08	2.12	2.25	2.37	2.49	2.21	2.12	2.42	1.98	2.21
Freq	3.5	4.8	6.8	6.7	5.7	7.7	16.3	13.2	9.1	10.1	10.3	6.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	4.8	4.7	4.3	4.0	4.4	4.4	4.7	5.1	5.5	6.3	4.1	4.8
	1.55	2.07	1.87	1.68	1.76	1.82	1.92	2.04	1.82	1.80	2.12	1.58	1.79
25	4.4	5.9	5.8	5.3	5.0	5.4	5.5	5.8	6.3	6.7	7.7	5.1	5.9
	1.65	2.22	2.00	1.80	1.89	1.95	2.06	2.19	1.92	1.88	2.20	1.69	1.90
50	5.2	6.9	6.8	6.3	5.9	6.4	6.4	6.8	7.3	7.8	8.9	6.0	6.9
	1.83	2.45	2.21	1.99	2.09	2.16	2.28	2.42	2.09	2.01	2.33	1.87	2.07
100	6.2	8.2	8.1	7.5	7.0	7.6	7.7	8.1	8.6	9.0	10.2	7.2	8.1
	2.01	2.70	2.43	2.19	2.30	2.37	2.50	2.66	2.30	2.20	2.55	2.05	2.28
200	7.7	10.1	10.0	9.2	8.6	9.4	9.5	10.0	10.4	10.7	12.0	8.8	9.9
	1.92	2.58	2.33	2.10	2.20	2.27	2.39	2.55	2.21	2.13	2.47	1.96	2.22
Freq	3.3	4.9	7.1	6.6	5.6	8.0	17.1	12.7	8.7	10.2	10.3	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.8	3.7	3.3	3.2	3.4	3.5	3.8	4.1	4.4	4.9	3.0	3.8
	1.59	2.08	1.85	1.67	1.77	1.82	1.93	2.05	1.83	1.83	2.12	1.58	1.80
25	3.8	5.0	4.8	4.4	4.2	4.5	4.6	4.9	5.3	5.7	6.4	3.9	4.9
	1.68	2.20	1.96	1.77	1.87	1.92	2.05	2.18	1.92	1.90	2.19	1.67	1.89
50	4.6	6.0	5.8	5.4	5.1	5.5	5.6	6.0	6.4	6.8	7.7	4.8	6.0
	1.83	2.39	2.13	1.92	2.03	2.09	2.22	2.37	2.05	2.00	2.30	1.82	2.03
100	5.6	7.2	7.1	6.5	6.1	6.6	6.8	7.2	7.6	8.1	9.0	5.8	7.1
	2.08	2.72	2.43	2.19	2.31	2.38	2.53	2.70	2.30	2.19	2.49	2.07	2.27
200	6.8	8.8	8.6	7.9	7.5	8.1	8.3	8.8	9.2	9.6	10.6	7.1	8.6
	2.00	2.63	2.34	2.11	2.23	2.30	2.44	2.60	2.24	2.18	2.50	1.99	2.24
Freq	3.3	5.2	7.1	6.5	5.7	9.0	17.1	12.0	8.7	10.1	10.3	5.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.9	375	4.9	152	4.2	100	3.3	48
25	7.6	479	5.8	240	5.2	175	4.4	104
50	8.1	577	6.7	331	6.1	256	5.3	169
100	8.8	744	7.9	506	7.2	389	6.3	264
200	9.7	1028	9.6	953	8.8	719	7.7	473

Snaefell

54° 18′ 00″ N	04° 28′ 00″ W	UTM 30	E 404551 m	N 6018022 m	615 m a.s.l.

Location close to the highest point of the Isle of Man (621 m). The distances to the Irish Sea are respectively: N: 15 km, E: 8 km, S: 10 km and W: 10 km. The rise to the summit is on average over a distance of 6 km, however, there are many local peaks.
Close to the station the ground is devoid of trees and bushes. There are some small buildings in the E, S, and SW sectors.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.03											106	-13
30	0.03											63	-8
60	0.03											65	9
90	0.03											110	13
120	0.03											144	5
150	0.03											143	-6
180	0.03											106	-13
210	0.03											63	-8
240	0.03											65	9
270	0.03											110	13
300	0.03											144	5
330	0.03											143	-6

Height of anemometer: 13.0 m a.g.l. Period: 74010100–82122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	3.8	15	23	53	71	65	76	83	64	52	136	119	101	58	83	10.9	2.04
30	3.4	31	42	53	74	74	75	56	66	60	153	136	83	44	54	10.1	2.13
60	3.9	20	33	39	46	61	57	80	73	66	131	128	101	58	106	11.2	2.10
90	4.0	11	26	30	46	56	62	67	56	67	109	121	92	69	187	12.7	1.96
120	8.9	14	19	31	48	33	43	60	57	47	95	97	94	76	284	14.7	1.92
150	9.9	10	17	20	39	36	37	38	43	38	91	106	106	94	327	15.9	2.18
180	8.1	4	12	16	26	29	26	40	36	37	86	115	116	93	366	16.8	2.16
210	9.2	6	10	18	23	28	34	51	49	54	125	124	118	96	266	14.9	2.28
240	9.7	8	5	13	19	24	21	37	42	44	98	105	112	111	362	16.7	2.59
270	14.1	4	9	11	20	21	23	38	36	37	105	101	107	101	389	17.3	2.36
300	15.1	7	9	11	19	24	26	39	43	45	104	100	104	95	371	17.1	2.10
330	10.0	5	13	20	33	27	40	45	52	59	104	112	118	100	269	15.2	2.15
Total	100.0	9	14	21	32	33	36	47	47	47	106	110	107	91	301	15.4	2.08

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	16.0	14.5	15.6	12.6	11.3	11.2	11.1	10.4	13.8	14.4	16.4	16.5	13.6
3	16.4	14.2	15.7	12.8	11.0	10.9	11.0	10.2	14.1	14.7	16.5	16.3	13.6
6	16.5	13.6	15.4	12.6	11.0	11.0	10.9	10.1	13.9	14.3	16.4	16.4	13.5
9	16.4	13.7	15.6	12.4	10.9	11.0	10.8	10.1	14.1	14.2	16.3	16.5	13.5
12	16.6	14.1	15.5	12.5	11.3	11.1	10.9	10.2	14.4	14.4	16.4	16.7	13.6
15	16.8	13.9	15.3	12.4	11.2	11.0	11.1	10.4	14.2	14.2	16.2	16.2	13.6
18	16.9	14.5	15.5	12.5	11.3	10.6	11.1	10.4	13.9	14.4	16.4	16.2	13.6
21	16.6	15.2	15.7	13.0	11.5	10.9	11.2	10.8	14.1	14.3	16.4	16.3	13.8
Day	16.5	14.2	15.5	12.6	11.2	11.0	11.0	10.3	14.0	14.4	16.4	16.4	13.6

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.6	8.7	9.3	8.9	8.4	8.8	10.4	12.2	13.3	11.6	9.8	8.8	10.4
	2.28	2.39	2.30	2.18	2.24	2.49	2.37	2.37	2.59	2.47	2.38	2.44	2.20
25	9.4	9.5	10.1	9.8	9.1	9.6	11.3	13.3	14.5	12.6	10.7	9.6	11.4
	2.34	2.46	2.35	2.22	2.31	2.56	2.41	2.39	2.61	2.50	2.43	2.51	2.24
50	10.1	10.2	10.8	10.4	9.8	10.3	12.1	14.2	15.4	13.5	11.5	10.3	12.2
	2.40	2.53	2.42	2.29	2.37	2.63	2.47	2.43	2.65	2.55	2.50	2.58	2.29
100	10.9	11.0	11.6	11.3	10.6	11.1	12.9	15.1	16.4	14.4	12.3	11.1	13.0
	2.34	2.45	2.37	2.24	2.30	2.55	2.43	2.42	2.65	2.53	2.45	2.51	2.28
200	12.0	12.1	12.7	12.3	11.7	12.3	14.0	16.2	17.5	15.5	13.4	12.3	14.1
	2.23	2.33	2.27	2.15	2.19	2.42	2.36	2.37	2.60	2.47	2.36	2.38	2.24
Freq	5.9	4.9	5.2	5.3	5.9	6.7	8.0	11.1	14.0	13.9	11.2	7.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	6.0	6.7	6.2	5.7	6.3	7.7	9.0	9.8	7.9	6.7	6.0	7.4
	1.92	2.04	2.01	1.87	1.89	2.17	2.16	2.21	2.47	2.24	2.08	2.09	1.99
25	7.3	7.2	7.9	7.3	6.8	7.5	9.0	10.5	11.4	9.3	7.9	7.1	8.8
	2.05	2.19	2.11	1.98	2.04	2.33	2.24	2.26	2.52	2.33	2.20	2.25	2.07
50	8.4	8.3	9.0	8.4	7.9	8.6	10.2	11.8	12.7	10.4	9.0	8.2	9.9
	2.25	2.44	2.28	2.15	2.28	2.60	2.37	2.35	2.61	2.46	2.38	2.53	2.21
100	9.8	9.8	10.4	9.8	9.4	10.1	11.6	13.2	14.2	11.8	10.4	9.8	11.4
	2.41	2.61	2.45	2.31	2.43	2.78	2.55	2.50	2.77	2.64	2.56	2.70	2.39
200	11.8	12.1	12.4	11.7	11.6	12.5	13.4	14.9	16.0	13.8	12.5	12.1	13.4
	2.31	2.49	2.37	2.22	2.32	2.65	2.47	2.45	2.72	2.56	2.47	2.58	2.40
Freq	5.6	4.7	5.3	5.4	6.1	6.8	8.4	11.9	14.6	13.8	10.4	7.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	5.3	5.8	5.3	5.1	5.6	6.8	7.9	8.4	6.8	5.8	5.2	6.5
	1.94	2.03	1.99	1.85	1.93	2.13	2.15	2.24	2.43	2.22	2.08	2.07	1.99
25	6.6	6.5	7.1	6.5	6.2	6.8	8.2	9.6	10.1	8.2	7.1	6.4	7.9
	2.05	2.16	2.08	1.95	2.06	2.26	2.21	2.28	2.48	2.30	2.19	2.21	2.06
50	7.6	7.6	8.1	7.6	7.3	7.9	9.4	10.9	11.5	9.4	8.2	7.5	9.1
	2.22	2.37	2.22	2.10	2.27	2.45	2.32	2.36	2.55	2.41	2.35	2.45	2.18
100	9.0	9.0	9.5	8.9	8.6	9.4	10.8	12.3	13.0	10.8	9.6	8.9	10.5
	2.44	2.60	2.44	2.31	2.49	2.70	2.53	2.49	2.69	2.63	2.58	2.69	2.37
200	10.8	11.0	11.3	10.7	10.6	11.4	12.6	14.1	14.8	12.6	11.4	11.0	12.3
	2.35	2.50	2.36	2.22	2.39	2.60	2.46	2.49	2.69	2.56	2.49	2.58	2.38
Freq	5.5	4.8	5.3	5.4	6.2	6.9	8.5	12.3	14.7	13.4	10.1	6.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	4.2	4.5	4.1	4.0	4.5	5.5	6.3	6.4	5.3	4.5	4.1	5.1
	1.95	2.04	1.96	1.86	1.97	2.13	2.17	2.28	2.40	2.22	2.06	2.06	2.00
25	5.5	5.6	5.9	5.4	5.3	5.9	7.1	8.1	8.3	6.8	5.9	5.4	6.6
	2.04	2.14	2.04	1.95	2.08	2.23	2.23	2.32	2.44	2.28	2.15	2.18	2.06
50	6.6	6.7	7.0	6.5	6.4	7.1	8.4	9.6	9.8	8.1	7.0	6.5	7.9
	2.19	2.30	2.15	2.08	2.26	2.37	2.31	2.38	2.50	2.38	2.29	2.36	2.15
100	7.9	8.0	8.3	7.8	7.7	8.4	9.8	11.1	11.4	9.5	8.3	7.8	9.3
	2.45	2.61	2.37	2.32	2.56	2.65	2.46	2.49	2.62	2.57	2.54	2.69	2.33
200	9.5	9.6	9.9	9.3	9.3	10.1	11.5	12.8	13.1	11.2	10.0	9.5	11.0
	2.39	2.53	2.35	2.27	2.47	2.60	2.49	2.55	2.67	2.58	2.50	2.59	2.38
Freq	5.4	4.8	5.3	5.5	6.3	7.1	8.9	12.6	14.7	13.0	9.6	6.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	9.3	847	6.6	336	5.7	221	4.5	107
25	10.1	1083	7.8	529	7.0	386	5.9	229
50	10.8	1294	8.8	725	8.0	560	7.0	370
100	11.5	1601	10.1	1023	9.3	809	8.2	567
200	12.5	2062	11.9	1667	10.9	1310	9.7	917

Valley

53° 15′ 00″ N 04° 32′ 00″ W	UTM 30 E 397691 m N 5901303 m	10 m a.s.l.

Situated on the western coast of Wales, facing the southwestern coast of the island of Anglesey in the Irish Sea. On the mainland of Wales E to SE from Valley and at a distance of 30 km the Welsh mountains rise abruptly as high as 1085 m. The mountains have a pronounced influence on the flow from the southeast quarter, giving as a general rule abnormally light winds and often large fluctuations in the wind direction.
The surface of Anglesey is rather flat and closer to the the station the terrain is very open in most directions. The distance to the coast is between 1 and 1.5 km in directions from E to S. The anemometer is placed 6 m above a 10-m high building (10 × 15 × 10 m). The speed-up effect is estimated to be 14% from all directions. Nearby airport buildings are found from N to E and NNW to NW.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.10											-2	
30	0.01	160	0.30	400	0.10							-1	
60	0.01	160	0.30	400	0.10							14	
90	0.01	160	0.05	300	0.10							14	
120	0.01	1000	0.10									14	
150	0.01	2000	0.10									14	
180	0.01	1500	0.00									14	
210	0.01	1000	0.00									14	
240	0.01	1000	0.00									14	
270	0.01	2000	0.10	5000	0.00							14	
300	0.01	3000	0.10	6000	0.01							11	
330	0.01	750	0.10	5000	0.01							7	

Height of anemometer: 16.0 m a.g.l. Period: 71010100-80122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	6.8	72	72	127	169	118	105	91	65	53	73	33	16	5	4	5.7	1.59
30	6.1	96	113	140	165	111	95	94	77	46	51	9	3	0	0	4.9	1.71
60	10.9	44	53	115	171	133	114	110	96	61	65	26	10	3	1	6.0	1.90
90	4.3	119	126	178	223	110	69	58	38	18	37	14	7	2	0	4.0	1.34
120	3.4	144	132	181	183	107	95	53	33	24	35	9	1	0	2	4.0	1.43
150	5.9	71	43	44	74	75	77	103	101	85	129	85	59	29	26	8.6	1.92
180	13.1	29	15	28	36	52	67	97	105	94	185	129	84	38	42	10.2	2.36
210	14.6	23	17	32	52	56	73	85	85	83	180	152	91	46	25	10.3	2.59
240	10.6	29	20	41	66	80	87	91	108	83	173	115	64	27	15	9.1	2.28
270	8.2	47	25	43	77	88	101	113	106	81	137	85	53	24	19	8.4	1.97
300	8.4	49	41	61	97	95	103	101	124	71	123	70	38	19	9	7.8	2.04
330	7.8	56	29	75	116	123	131	126	101	63	99	40	22	9	8	6.9	1.90
Total	100.0	52	44	73	103	90	92	97	93	70	124	79	47	21	16	7.9	1.85

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	8.4	6.9	6.9	5.7	5.3	5.2	5.0	4.7	6.5	6.8	8.3	8.3	6.5
3	8.4	6.8	6.9	5.5	5.3	5.2	5.0	4.8	6.2	6.8	8.1	8.1	6.4
6	8.2	6.6	6.9	5.5	5.5	5.4	5.0	4.8	6.4	6.8	8.1	8.0	6.4
9	8.3	6.5	7.4	6.8	6.5	6.6	6.1	5.8	7.1	7.0	8.0	8.3	7.0
12	8.8	7.2	8.1	7.5	7.1	7.0	6.7	6.5	7.7	7.7	8.8	8.7	7.7
15	8.7	7.3	8.1	7.3	7.2	7.0	6.6	6.5	7.8	7.5	8.8	8.5	7.6
18	8.4	6.5	7.1	6.5	6.5	6.5	6.1	5.8	6.8	6.7	8.5	8.4	7.0
21	8.5	6.7	6.8	5.5	5.3	5.6	5.2	4.9	6.5	6.8	8.4	8.2	6.5
Day	8.5	6.8	7.3	6.3	6.1	6.1	5.7	5.5	6.9	7.0	8.4	8.3	6.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.6	8.0	8.0	6.3	4.9	9.1	9.4	9.2	8.4	8.3	8.7	8.5	8.4
	1.79	1.89	2.16	1.71	1.63	1.99	2.27	2.51	2.31	1.99	2.29	2.17	2.07
25	9.4	8.8	8.8	6.9	5.4	9.9	10.2	10.1	9.2	9.0	9.5	9.3	9.2
	1.82	1.93	2.23	1.76	1.69	2.03	2.32	2.58	2.39	2.05	2.35	2.23	2.12
50	10.1	9.4	9.4	7.4	5.8	10.6	10.9	10.8	9.9	9.7	10.2	10.0	9.9
	1.87	1.99	2.29	1.81	1.73	2.09	2.38	2.65	2.45	2.10	2.42	2.29	2.17
100	10.8	10.1	10.2	8.0	6.3	11.3	11.8	11.7	10.7	10.5	11.0	10.8	10.6
	1.84	1.94	2.22	1.76	1.67	2.05	2.33	2.58	2.37	2.04	2.35	2.23	2.12
200	11.6	11.0	11.3	8.8	6.9	12.3	12.9	12.8	11.9	11.5	12.1	11.8	11.7
	1.78	1.86	2.10	1.66	1.59	1.98	2.24	2.46	2.24	1.95	2.24	2.13	2.04
Freq	6.9	6.2	9.9	5.7	3.6	5.4	11.8	14.3	11.3	8.6	8.3	7.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	5.5	5.6	3.7	3.5	6.8	6.6	6.4	5.7	5.8	6.1	6.0	5.9
	1.57	1.67	1.82	1.36	1.33	1.91	2.01	2.15	1.92	1.67	1.94	1.84	1.79
25	7.3	6.5	6.7	4.5	4.2	8.1	7.8	7.7	6.9	6.9	7.3	7.1	7.0
	1.63	1.79	1.96	1.47	1.43	2.00	2.13	2.30	2.07	1.77	2.07	1.96	1.90
50	8.2	7.5	7.7	5.3	4.9	9.1	8.9	8.8	7.9	7.9	8.3	8.1	8.1
	1.73	1.97	2.20	1.64	1.61	2.13	2.32	2.55	2.33	1.94	2.29	2.15	2.08
100	9.4	8.8	9.1	6.3	5.9	10.5	10.4	10.3	9.4	9.3	9.7	9.5	9.4
	1.85	2.11	2.35	1.75	1.71	2.30	2.49	2.73	2.48	2.08	2.45	2.31	2.23
200	10.9	10.8	11.3	7.8	7.3	12.3	12.5	12.6	11.7	11.2	11.9	11.6	11.5
	1.79	2.02	2.24	1.67	1.63	2.22	2.39	2.61	2.37	2.00	2.35	2.21	2.16
Freq	6.8	6.3	10.7	4.3	3.5	6.3	13.2	14.4	10.4	8.2	8.3	7.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	4.8	4.8	3.1	3.3	6.0	5.7	5.6	5.0	5.0	5.3	5.2	5.1
	1.58	1.69	1.81	1.30	1.28	1.98	2.02	2.12	1.89	1.67	1.94	1.81	1.78
25	6.5	5.9	5.9	3.9	4.2	7.3	7.0	6.8	6.2	6.2	6.5	6.4	6.3
	1.63	1.79	1.93	1.39	1.37	2.06	2.13	2.25	2.02	1.76	2.05	1.91	1.88
50	7.5	6.9	7.0	4.6	4.9	8.4	8.1	7.9	7.2	7.2	7.6	7.4	7.4
	1.72	1.96	2.13	1.53	1.51	2.19	2.30	2.46	2.24	1.91	2.23	2.06	2.04
100	8.6	8.1	8.3	5.6	5.9	9.7	9.5	9.4	8.6	8.5	8.9	8.7	8.7
	1.87	2.15	2.35	1.68	1.65	2.40	2.52	2.71	2.45	2.10	2.45	2.27	2.24
200	10.1	9.9	10.2	6.8	7.3	11.5	11.4	11.4	10.6	10.3	10.8	10.5	10.5
	1.82	2.06	2.25	1.61	1.58	2.33	2.43	2.60	2.35	2.02	2.36	2.19	2.17
Freq	6.7	6.8	10.1	4.2	3.7	6.9	13.3	14.0	10.2	8.2	8.3	7.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	3.8	3.7	2.6	3.1	4.7	4.5	4.3	3.9	3.9	4.2	4.1	4.0
	1.59	1.73	1.78	1.42	1.37	2.06	2.05	2.10	1.86	1.67	1.93	1.78	1.80
25	5.4	5.0	4.9	3.4	4.1	6.2	5.9	5.7	5.2	5.2	5.4	5.4	5.3
	1.64	1.83	1.88	1.50	1.45	2.14	2.15	2.21	1.97	1.75	2.03	1.86	1.89
50	6.4	6.0	5.9	4.2	4.9	7.3	7.0	6.8	6.3	6.2	6.6	6.4	6.4
	1.72	1.97	2.05	1.62	1.56	2.25	2.29	2.38	2.14	1.87	2.17	1.98	2.02
100	7.6	7.2	7.2	5.1	6.0	8.7	8.4	8.1	7.5	7.5	7.8	7.7	7.6
	1.86	2.23	2.33	1.85	1.76	2.47	2.55	2.71	2.44	2.10	2.44	2.19	2.25
200	9.0	8.7	8.7	6.2	7.2	10.3	10.1	9.9	9.2	9.0	9.4	9.2	9.2
	1.87	2.16	2.24	1.78	1.71	2.45	2.50	2.62	2.35	2.05	2.37	2.15	2.21
Freq	6.6	7.4	9.3	4.1	4.0	7.8	13.5	13.6	9.9	8.2	8.2	7.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.5	469	5.2	190	4.6	126	3.6	60
25	8.1	599	6.2	299	5.6	219	4.7	130
50	8.7	720	7.1	411	6.5	318	5.7	210
100	9.4	924	8.4	619	7.7	477	6.8	324
200	10.3	1266	10.2	1146	9.3	871	8.2	577

Waddington

53° 10′ 00″ N 00° 32′ 00″ E	UTM 31 E 335105 m N 5893777 m	70 m a.s.l.

Location 50 km W of the North Sea coast and 50–75 km E of the Pennine Mountains (altitudes up to 600 m). A low escarpment runs from N to S close to the station. Less than 2 km W of the airport lies the crest of the escarpment; beyond this there is an abrupt descent to a wide plain (appr. 50 m altitude). The airport is situated about 7 km S of Lincoln and extensive housing estates extend towards the north side of the airport. Otherwise the airport is surrounded by farmland.
The anemometer is placed at the W side of the runways with nearby buildings in the N sector.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	100	0.30	2000	0.15								
30	0.01	2000	0.10										
60	0.01	800	0.20	1600	0.10								
90	0.01	400	0.20	800	0.10								
120	0.01	800	0.10										
150	0.01	600	0.10										
180	0.01	1000	0.10										
210	0.03	1500	0.20	3000	0.10								
240	0.03	750	0.10										
270	0.03	750	0.10										
300	0.03	500	0.30	1200	0.15	4000	0.30						
330	0.03	350	0.30	1500	0.10	4000	0.30						

Height of anemometer: 10.0 m a.g.l. Period: 71010100–80122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.3	50	59	109	187	186	152	112	82	34	22	4	2	0	0	5.3	2.31
30	7.0	34	47	107	164	159	137	132	90	62	54	14	3	0	0	5.8	2.23
60	6.0	42	56	109	163	152	142	117	92	48	57	19	4	0	0	5.8	2.09
90	5.2	55	88	129	180	163	140	80	68	42	40	12	3	0	1	5.2	1.90
120	6.1	54	84	144	199	144	116	82	80	39	43	13	2	0	0	5.1	1.83
150	6.7	60	93	128	148	146	116	103	81	42	56	20	6	0	0	5.4	1.85
180	6.1	48	58	91	128	129	135	132	94	60	78	35	8	1	1	6.3	2.11
210	14.5	20	34	73	154	196	170	135	90	51	57	15	4	0	0	6.0	2.31
240	17.3	18	39	95	173	159	143	125	94	64	61	18	5	2	1	6.1	2.12
270	10.5	36	71	166	187	111	106	105	79	48	61	23	5	1	0	5.5	1.80
300	7.8	49	74	157	232	172	103	87	60	31	24	11	0	0	0	4.8	1.85
330	7.5	38	59	136	234	205	122	90	63	29	20	3	0	0	0	4.9	2.16
Total	100.0	37	59	116	178	161	134	112	83	48	50	16	4	1	0	5.6	2.00

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	5.6	4.7	5.1	4.4	4.3	3.5	3.3	3.4	4.2	4.3	5.5	5.5	4.5
3	5.5	4.7	5.0	4.4	4.0	3.5	3.3	3.4	4.2	4.3	5.4	5.6	4.4
6	5.5	4.8	5.0	4.5	4.3	3.9	3.6	3.5	4.2	4.4	5.3	5.5	4.5
9	5.5	4.9	5.8	5.6	5.4	4.8	4.5	4.5	5.1	4.8	5.5	5.7	5.2
12	6.2	5.6	6.7	6.2	6.0	5.1	4.8	5.0	5.9	5.9	6.3	6.2	5.8
15	5.8	5.4	6.6	6.3	6.1	5.3	5.1	5.3	5.8	5.7	5.8	5.9	5.8
18	5.4	4.8	5.6	5.6	5.8	4.9	4.8	4.8	4.6	4.4	5.4	5.6	5.2
21	5.5	4.8	5.1	4.4	4.3	3.6	3.5	3.6	4.1	4.3	5.4	5.7	4.5
Day	5.6	5.0	5.6	5.2	5.0	4.3	4.1	4.2	4.8	4.8	5.6	5.7	5.0

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.1	8.7	8.3	8.1	7.5	7.8	8.6	9.1	9.1	8.7	7.9	8.0	8.5
	2.47	2.64	2.54	2.33	2.21	2.19	2.33	2.68	2.50	2.26	2.12	2.41	2.37
25	9.9	9.5	9.1	8.8	8.2	8.6	9.4	9.9	10.0	9.5	8.6	8.8	9.3
	2.54	2.72	2.62	2.40	2.28	2.26	2.40	2.76	2.57	2.32	2.18	2.49	2.44
50	10.6	10.2	9.7	9.5	8.8	9.2	10.1	10.6	10.7	10.2	9.3	9.4	10.0
	2.61	2.80	2.69	2.46	2.34	2.32	2.47	2.83	2.64	2.39	2.24	2.55	2.51
100	11.5	11.1	10.6	10.3	9.6	10.0	10.9	11.5	11.5	11.0	10.1	10.2	10.8
	2.54	2.71	2.60	2.38	2.27	2.25	2.40	2.75	2.57	2.33	2.17	2.47	2.44
200	12.6	12.3	11.7	11.4	10.6	11.0	12.0	12.7	12.7	12.0	11.1	11.3	11.9
	2.42	2.56	2.46	2.26	2.15	2.13	2.28	2.61	2.45	2.22	2.06	2.34	2.32
Freq	6.1	6.5	6.3	5.4	5.8	6.5	6.4	11.6	16.3	12.8	8.7	7.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.8	5.8	5.8	5.5	5.1	5.5	6.3	6.3	6.4	5.9	5.4	5.7	6.0
	2.21	2.20	2.09	1.90	1.83	1.83	2.08	2.29	2.11	1.84	1.82	2.11	2.01
25	8.1	6.9	7.0	6.6	6.2	6.6	7.4	7.6	7.7	7.0	6.5	6.8	7.1
	2.34	2.37	2.26	2.05	1.98	1.98	2.22	2.47	2.24	1.96	1.97	2.28	2.16
50	9.2	8.0	8.1	7.7	7.1	7.7	8.5	8.7	8.8	8.1	7.6	7.8	8.2
	2.55	2.67	2.54	2.31	2.22	2.22	2.45	2.76	2.47	2.16	2.21	2.56	2.40
100	10.6	9.5	9.6	9.1	8.4	9.1	10.0	10.3	10.2	9.4	9.0	9.3	9.7
	2.74	2.84	2.70	2.45	2.37	2.36	2.62	2.94	2.64	2.31	2.35	2.72	2.56
200	12.8	11.8	11.9	11.3	10.5	11.3	12.2	12.8	12.4	11.5	11.2	11.6	11.9
	2.63	2.72	2.58	2.35	2.26	2.26	2.51	2.81	2.54	2.22	2.25	2.60	2.46
Freq	5.5	7.0	6.1	5.3	6.0	6.6	6.2	13.7	17.0	11.1	8.0	7.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	5.0	5.1	4.8	4.4	4.9	5.5	5.5	5.6	5.1	4.7	5.0	5.2
	2.29	2.23	2.09	1.89	1.82	1.87	2.09	2.29	2.10	1.80	1.85	2.13	2.02
25	7.4	6.2	6.3	5.9	5.5	6.0	6.8	6.8	6.9	6.2	5.8	6.1	6.4
	2.41	2.38	2.24	2.03	1.95	2.00	2.22	2.45	2.22	1.90	1.98	2.28	2.15
50	8.6	7.2	7.4	6.9	6.4	7.1	7.9	7.9	8.0	7.3	6.8	7.2	7.5
	2.59	2.64	2.48	2.24	2.15	2.21	2.42	2.70	2.41	2.06	2.19	2.53	2.35
100	10.0	8.6	8.8	8.3	7.7	8.4	9.3	9.4	9.4	8.6	8.2	8.5	8.9
	2.84	2.90	2.73	2.46	2.37	2.43	2.65	2.97	2.65	2.27	2.40	2.78	2.58
200	12.0	10.6	10.9	10.2	9.5	10.4	11.2	11.6	11.3	10.3	10.1	10.5	10.8
	2.74	2.78	2.61	2.36	2.26	2.33	2.55	2.84	2.55	2.18	2.30	2.66	2.49
Freq	5.3	7.1	6.0	5.2	6.1	6.7	6.1	14.4	17.3	10.5	7.8	7.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	3.9	4.0	3.7	3.5	3.9	4.3	4.3	4.4	4.0	3.8	4.0	4.1
	2.25	2.23	2.07	1.90	1.83	1.91	2.14	2.28	2.09	1.80	1.92	2.15	2.03
25	6.1	5.2	5.3	4.9	4.7	5.2	5.7	5.7	5.8	5.2	5.0	5.2	5.4
	2.35	2.37	2.20	2.01	1.94	2.02	2.25	2.40	2.19	1.89	2.03	2.28	2.14
50	7.3	6.2	6.3	5.9	5.7	6.2	6.8	6.9	6.9	6.3	6.0	6.3	6.5
	2.50	2.57	2.38	2.18	2.11	2.19	2.42	2.60	2.34	2.03	2.21	2.47	2.31
100	8.6	7.5	7.6	7.2	6.8	7.5	8.1	8.2	8.2	7.5	7.2	7.6	7.8
	2.79	2.93	2.72	2.49	2.40	2.49	2.74	2.96	2.63	2.28	2.52	2.81	2.61
200	10.4	9.2	9.3	8.8	8.3	9.1	9.9	10.0	9.9	9.0	8.8	9.3	9.4
	2.74	2.83	2.62	2.40	2.32	2.40	2.65	2.86	2.56	2.22	2.43	2.71	2.54
Freq	5.7	6.8	5.9	5.3	6.2	6.6	7.1	14.8	16.5	10.1	7.7	7.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.6	434	5.3	172	4.6	113	3.6	55
25	8.3	555	6.3	273	5.7	200	4.8	119
50	8.9	673	7.3	383	6.6	295	5.7	194
100	9.6	870	8.6	598	7.9	458	6.9	307
200	10.6	1208	10.5	1145	9.6	858	8.4	561

Wick

58° 30′ 00″ N 03° 06′ 00″ E	UTM 31 E 505828 m N 6484531 m	35 m a.s.l.

Located near the northernmost point of Scotland on the east coast. The highlands of Scotland have a noticeable influence on the frequency of winds from the southwest quarter, making it less than at most other places in the British Isles.
The distance to the coast is between 2 and 3 km in directions from NNW to SE. The town of Wick lies to the S with the centre approximately 1 km away. In the vicinity of the station the terrain is very open in most directions.
The anemometer is placed between the runways of Wick Airport, with the airport buildings approximately 200 m to the SSE.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	2000	0.00										
30	0.01	3000	0.00										
60	0.01	3000	0.00										
90	0.01	2500	0.00										
120	0.01	350	0.30	700	0.03	2500	0.00						
150	0.01	300	0.30	1500	0.03	3500	0.00						
180	0.01	300	0.30	4000	0.01								
210	0.01	400	0.05										
240	0.01	500	0.05										
270	0.01	500	0.05										
300	0.01												
330	0.01	3000	0.01										

Height of anemometer: 10.0 m a.g.l. Period: 71010100-80122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	A	k
0	5.5	48	43	59	83	106	111	121	104	85	131	58	28	12	9	7.6	2.05
30	3.9	56	68	91	146	135	115	107	91	55	81	28	14	6	8	6.2	1.72
60	3.7	80	60	107	172	138	113	94	69	53	66	33	12	4	1	5.7	1.68
90	4.3	66	76	122	150	130	98	86	70	58	68	39	20	17	0	5.9	1.55
120	7.5	39	62	91	150	131	128	114	91	52	77	44	16	4	1	6.3	1.89
150	14.3	28	46	71	133	127	121	119	109	69	108	45	16	7	0	6.9	2.10
180	12.0	33	52	65	130	156	145	134	111	55	76	30	10	3	0	6.4	2.16
210	10.3	54	63	68	105	119	143	140	110	58	83	35	15	4	3	6.7	2.12
240	9.4	66	90	82	102	114	116	113	99	60	92	41	13	7	3	6.5	1.93
270	12.3	75	96	111	128	100	95	80	79	63	86	48	20	13	6	6.3	1.59
300	8.9	39	55	79	110	96	99	103	91	73	131	65	37	16	8	7.6	1.91
330	7.8	36	36	57	105	125	131	138	103	86	111	44	20	8	1	7.2	2.19
Total	100.0	49	62	81	123	122	120	114	97	64	94	43	18	8	3	6.7	1.91

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	7.1	6.0	6.1	5.0	4.3	3.8	3.6	3.4	5.1	5.8	6.5	7.1	5.3
3	7.0	6.0	5.9	5.1	4.3	3.9	3.7	3.4	5.1	5.9	6.6	7.1	5.3
6	7.0	5.9	6.0	5.1	4.7	4.4	4.0	3.5	5.1	5.8	6.5	7.2	5.4
9	7.0	6.1	6.5	6.3	5.6	5.5	5.3	4.7	6.2	6.1	6.8	7.4	6.1
12	7.2	6.7	7.4	6.9	6.2	5.9	5.7	5.3	6.8	7.1	7.3	7.6	6.7
15	7.4	6.4	7.3	6.9	6.2	6.1	5.8	5.3	6.7	6.7	7.0	7.4	6.6
18	7.2	5.9	6.4	6.1	5.6	5.6	5.4	4.5	5.7	5.9	6.6	7.4	6.0
21	7.1	6.0	6.1	5.2	4.5	4.1	4.0	3.6	5.1	5.8	6.3	7.2	5.4
Day	7.1	6.1	6.5	5.8	5.2	4.9	4.7	4.2	5.7	6.1	6.7	7.3	5.9

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.6	7.4	6.6	6.7	7.7	9.0	9.8	9.6	9.2	8.8	9.5	9.3	8.9
	2.06	1.76	1.68	1.56	1.86	2.06	2.45	2.42	2.23	1.81	2.06	2.45	2.05
25	9.4	8.1	7.3	7.3	8.4	9.8	10.7	10.4	10.1	9.6	10.3	10.1	9.7
	2.11	1.81	1.73	1.60	1.91	2.10	2.50	2.48	2.28	1.84	2.10	2.52	2.09
50	10.1	8.7	7.8	7.9	9.1	10.5	11.4	11.1	10.8	10.3	11.0	10.9	10.4
	2.17	1.85	1.78	1.65	1.96	2.16	2.57	2.55	2.35	1.88	2.15	2.59	2.15
100	10.9	9.4	8.4	8.5	9.8	11.3	12.3	12.0	11.6	11.0	11.8	11.7	11.2
	2.12	1.80	1.73	1.60	1.91	2.12	2.51	2.49	2.30	1.85	2.11	2.52	2.10
200	11.9	10.4	9.3	9.3	10.8	12.3	13.3	13.1	12.6	11.9	12.8	12.8	12.2
	2.03	1.72	1.63	1.52	1.81	2.03	2.42	2.39	2.20	1.80	2.05	2.41	2.03
Freq	5.8	4.1	3.7	4.2	7.1	13.3	12.3	10.6	9.5	11.9	9.5	8.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	4.9	4.5	4.8	5.6	6.4	6.9	6.7	6.4	6.3	6.9	6.5	6.2
	1.74	1.44	1.41	1.37	1.63	1.82	2.15	2.10	1.87	1.62	1.92	2.17	1.79
25	7.1	5.9	5.4	5.7	6.6	7.6	8.2	7.9	7.6	7.4	8.1	7.8	7.4
	1.84	1.55	1.52	1.47	1.74	1.91	2.26	2.21	1.97	1.68	2.00	2.31	1.89
50	8.2	6.9	6.4	6.7	7.7	8.6	9.3	9.0	8.7	8.4	9.2	8.9	8.5
	2.02	1.73	1.70	1.63	1.92	2.07	2.44	2.40	2.12	1.78	2.13	2.55	2.04
100	9.5	8.2	7.6	7.9	9.0	10.0	10.7	10.4	10.0	9.6	10.5	10.4	9.8
	2.16	1.85	1.81	1.74	2.05	2.22	2.62	2.58	2.28	1.91	2.30	2.73	2.19
200	11.5	10.1	9.4	9.7	11.0	11.9	12.8	12.5	11.9	11.2	12.3	12.6	11.7
	2.08	1.76	1.73	1.67	1.97	2.14	2.53	2.49	2.20	1.85	2.22	2.62	2.12
Freq	5.3	3.9	3.8	4.6	8.2	14.0	11.9	10.2	9.7	12.0	8.8	7.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	4.2	3.9	4.2	4.9	5.6	6.0	5.8	5.6	5.6	6.0	5.7	5.4
	1.72	1.43	1.38	1.40	1.65	1.83	2.14	2.08	1.83	1.64	1.95	2.18	1.79
25	6.3	5.3	4.9	5.3	6.1	6.8	7.4	7.1	6.8	6.8	7.3	7.0	6.7
	1.81	1.52	1.48	1.49	1.74	1.92	2.24	2.19	1.91	1.70	2.03	2.30	1.88
50	7.4	6.2	5.8	6.2	7.1	7.9	8.5	8.2	7.9	7.8	8.4	8.1	7.7
	1.96	1.68	1.63	1.63	1.89	2.05	2.40	2.35	2.03	1.78	2.15	2.50	2.01
100	8.7	7.4	6.9	7.4	8.4	9.2	9.9	9.6	9.1	9.0	9.7	9.5	9.0
	2.15	1.85	1.79	1.79	2.08	2.25	2.63	2.58	2.23	1.94	2.35	2.75	2.20
200	10.5	9.1	8.5	9.0	10.1	11.0	11.8	11.5	10.8	10.5	11.4	11.5	10.8
	2.07	1.77	1.72	1.72	2.00	2.17	2.54	2.49	2.15	1.89	2.28	2.64	2.14
Freq	5.2	3.9	3.8	4.9	8.8	13.8	11.8	10.2	10.0	11.6	8.7	7.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	3.3	3.1	3.4	4.0	4.4	4.7	4.6	4.3	4.4	4.7	4.5	4.3
	1.68	1.42	1.36	1.46	1.68	1.84	2.15	2.05	1.78	1.69	1.98	2.17	1.79
25	5.2	4.3	4.1	4.5	5.2	5.8	6.2	5.9	5.7	5.8	6.1	5.9	5.6
	1.76	1.51	1.44	1.53	1.76	1.92	2.23	2.14	1.85	1.74	2.05	2.27	1.87
50	6.3	5.3	5.0	5.5	6.3	6.9	7.3	7.1	6.8	6.9	7.3	7.0	6.7
	1.88	1.63	1.56	1.65	1.88	2.03	2.36	2.27	1.94	1.81	2.15	2.42	1.97
100	7.5	6.4	6.1	6.6	7.5	8.2	8.7	8.4	8.0	8.1	8.6	8.4	8.0
	2.10	1.85	1.78	1.87	2.10	2.23	2.60	2.51	2.12	1.95	2.35	2.72	2.18
200	9.0	7.8	7.4	8.0	9.0	9.8	10.4	10.1	9.5	9.5	10.1	10.1	9.5
	2.05	1.79	1.71	1.81	2.05	2.21	2.58	2.47	2.11	1.96	2.34	2.65	2.16
Freq	5.0	3.8	3.9	5.3	9.6	13.5	11.6	10.1	10.4	11.1	8.5	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	555	5.6	226	4.8	149	3.8	72
25	8.6	708	6.6	353	5.9	259	5.0	154
50	9.2	846	7.5	483	6.9	375	5.9	248
100	9.9	1074	8.7	702	8.0	547	7.1	378
200	10.8	1439	10.4	1241	9.6	956	8.4	649

Yeovilton

51° 00′ 00″ N	02° 38′ 00″ W	UTM 30 E 525730 m	N 5650004 m	17 m a.s.l.

Location 6 km N of the town of Yeovil and some 40 km N of the English Channel. The surrounding countryside is predominantly farmland with several small villages and some parts wooded. The anemometer is placed between the runways SSE of the airport buildings.

Sect	z_{01}	x_1	z_{02}	x_2	z_{03}	x_3	z_{04}	x_4	z_{05}	x_5	z_{06}	Pct	Deg
0	0.01	200	0.30	600	0.05								
30	0.01	500	0.25	1000	0.05								
60	0.01	1000	0.15										
90	0.01	800	0.15	1600	0.05								
120	0.01	1000	0.05	2000	0.15								
150	0.01	600	0.05	2000	0.15								
180	0.01	1000	0.05	2000	0.15								
210	0.01	600	0.20	2000	0.10								
240	0.01	1000	0.15										
270	0.01	100	0.30	800	0.15								
300	0.01	100	0.40	750	0.15								
330	0.01	100	0.30	800	0.15								

Height of anemometer: 12.0 m a.g.l. Period: 71010103-80122400

Sect	Freq	<1	2	3	4	5	6	7	8	9	11	13	15	17	>17	*A*	*k*
0	5.9	299	66	112	148	94	84	68	49	31	38	9	3	1	0	4.1	1.42
30	7.8	236	46	70	127	88	124	96	83	39	65	17	7	1	1	5.3	1.72
60	6.3	266	43	79	90	101	99	104	90	48	52	20	7	2	0	5.3	1.70
90	5.9	316	55	87	116	79	102	88	54	37	42	14	7	1	1	4.4	1.42
120	6.2	281	73	90	141	90	90	90	63	33	40	6	2	0	0	4.3	1.54
150	6.9	275	57	80	136	105	92	88	64	30	41	22	4	5	2	4.7	1.44
180	8.3	216	49	72	101	95	91	92	79	49	82	38	22	8	4	5.9	1.58
210	13.2	150	46	73	101	94	110	115	109	53	79	42	18	6	3	6.5	1.88
240	10.9	171	59	120	168	126	117	86	64	32	32	20	3	1	1	4.9	1.64
270	11.4	186	76	99	134	106	102	93	63	37	67	22	7	7	1	5.2	1.56
300	10.1	188	48	67	94	90	89	93	101	52	97	44	24	7	2	6.4	1.74
330	7.2	241	48	82	123	106	102	105	82	45	42	19	5	1	2	5.1	1.67
Total	100.0	222	55	86	123	99	102	95	78	41	60	25	10	4	2	5.3	1.59

UTC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
0	4.1	4.6	4.3	3.0	2.7	2.4	2.3	2.3	2.6	3.2	4.5	5.2	3.4
3	4.8	4.1	3.9	3.2	2.6	2.1	1.8	2.1	2.5	3.2	3.7	4.8	3.2
6	3.8	4.3	4.6	3.1	2.7	2.5	2.4	2.1	2.6	3.1	4.8	5.6	3.4
9	4.9	4.1	5.1	5.4	5.3	4.5	4.1	4.1	3.9	3.8	4.1	4.8	4.5
12	5.2	5.8	7.2	5.7	5.9	5.4	5.4	5.2	5.9	5.8	6.6	6.7	5.9
15	6.3	6.0	6.8	6.7	6.7	5.8	5.7	5.7	6.1	5.6	5.9	5.9	6.1
18	4.4	5.1	6.2	5.6	5.7	5.3	5.7	4.9	4.7	3.9	4.9	5.6	5.2
21	5.1	4.4	4.2	3.6	3.4	2.9	2.7	2.5	3.0	3.4	4.1	5.1	3.7
Day	5.0	4.7	5.2	4.6	4.4	3.8	3.7	3.6	3.9	4.0	4.6	5.3	4.4

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.4	7.3	7.5	6.7	6.1	6.7	7.8	9.1	7.7	8.3	10.5	9.8	8.1
	1.64	1.90	2.00	1.77	1.76	1.70	1.71	2.03	1.92	1.63	1.73	1.77	1.69
25	8.1	8.0	8.2	7.3	6.7	7.3	8.6	9.9	8.4	9.1	11.4	10.7	8.8
	1.67	1.96	2.06	1.83	1.81	1.75	1.74	2.07	1.98	1.66	1.74	1.79	1.72
50	8.6	8.6	8.8	7.8	7.2	7.8	9.2	10.6	9.1	9.7	12.1	11.4	9.5
	1.72	2.01	2.12	1.87	1.86	1.79	1.79	2.12	2.03	1.70	1.77	1.82	1.76
100	9.3	9.3	9.6	8.5	7.8	8.5	9.8	11.4	9.8	10.4	12.9	12.2	10.2
	1.68	1.95	2.05	1.81	1.80	1.74	1.75	2.08	1.98	1.67	1.77	1.81	1.74
200	10.0	10.3	10.6	9.4	8.6	9.3	10.6	12.3	10.7	11.1	13.8	13.0	11.0
	1.62	1.85	1.94	1.72	1.71	1.65	1.69	2.01	1.88	1.63	1.74	1.77	1.70
Freq	6.3	7.2	6.8	6.0	6.1	6.7	7.9	11.6	11.6	11.1	10.6	8.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	5.2	5.2	4.3	4.2	4.7	5.7	6.5	4.9	6.3	8.0	6.6	5.7
	1.41	1.67	1.68	1.43	1.51	1.42	1.54	1.85	1.62	1.52	1.69	1.63	1.51
25	5.7	6.3	6.2	5.2	5.1	5.6	6.8	7.7	5.9	7.4	9.4	7.8	6.8
	1.50	1.80	1.81	1.54	1.63	1.52	1.62	1.93	1.75	1.57	1.73	1.69	1.58
50	6.6	7.3	7.2	6.1	6.0	6.5	7.7	8.8	6.9	8.4	10.4	8.8	7.7
	1.64	2.02	2.03	1.73	1.83	1.68	1.73	2.07	1.96	1.65	1.77	1.77	1.69
100	7.7	8.6	8.6	7.3	7.1	7.7	8.9	10.1	8.2	9.5	11.7	9.9	9.0
	1.76	2.15	2.16	1.84	1.95	1.79	1.85	2.23	2.09	1.76	1.88	1.90	1.83
200	9.3	10.6	10.7	9.1	8.8	9.4	10.5	11.9	10.2	11.0	13.2	11.5	10.7
	1.69	2.06	2.06	1.76	1.86	1.72	1.79	2.15	1.99	1.72	1.85	1.85	1.82
Freq	6.1	7.7	6.4	5.9	6.2	6.8	8.2	12.8	11.1	11.1	10.2	7.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.6	4.5	3.7	3.7	4.2	5.1	5.7	4.2	5.7	7.1	5.6	5.0
	1.41	1.71	1.67	1.42	1.53	1.45	1.57	1.85	1.65	1.56	1.73	1.65	1.52
25	5.0	5.7	5.6	4.6	4.6	5.1	6.2	6.9	5.2	6.9	8.6	6.8	6.1
	1.49	1.83	1.79	1.52	1.64	1.53	1.63	1.93	1.77	1.60	1.76	1.71	1.59
50	5.8	6.7	6.6	5.5	5.5	6.0	7.2	8.0	6.2	7.9	9.8	7.8	7.1
	1.63	2.02	1.97	1.67	1.81	1.67	1.73	2.06	1.96	1.67	1.81	1.79	1.69
100	6.9	8.0	7.8	6.6	6.5	7.2	8.3	9.3	7.4	9.1	11.1	9.1	8.3
	1.79	2.22	2.17	1.84	1.99	1.84	1.89	2.25	2.15	1.79	1.89	1.96	1.84
200	8.5	9.8	9.7	8.1	8.0	8.7	9.8	11.0	9.1	10.4	12.6	10.6	9.9
	1.72	2.13	2.07	1.76	1.91	1.76	1.83	2.18	2.06	1.76	1.90	1.90	1.84
Freq	6.0	7.8	6.3	5.9	6.2	6.9	8.3	13.2	10.8	11.2	10.1	7.3	100.0

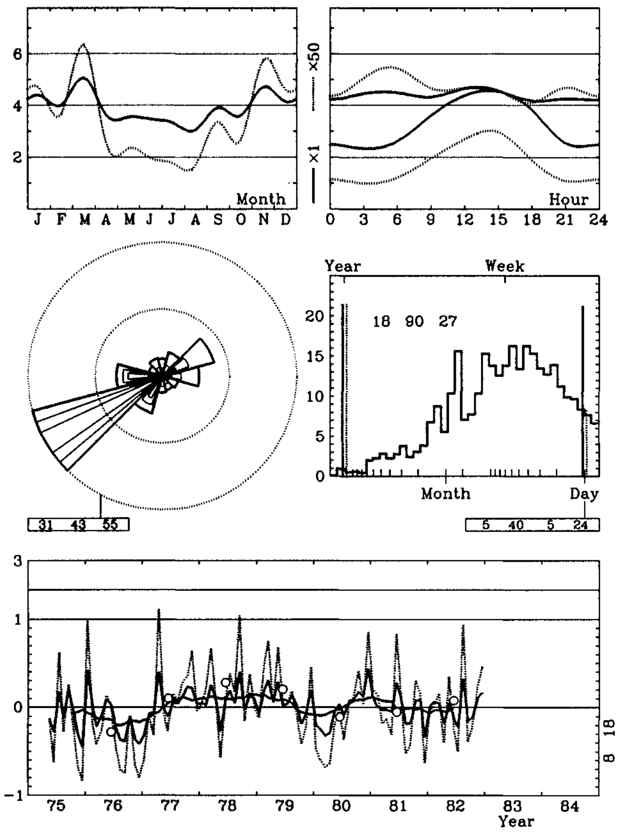
Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.6	3.5	3.0	3.0	3.3	4.1	4.3	3.4	4.6	5.5	4.3	3.9
	1.43	1.70	1.64	1.46	1.54	1.45	1.62	1.80	1.58	1.57	1.73	1.62	1.53
25	4.2	4.8	4.6	3.9	4.0	4.4	5.3	5.7	4.5	5.9	7.2	5.6	5.1
	1.51	1.79	1.74	1.54	1.63	1.51	1.67	1.87	1.66	1.61	1.76	1.67	1.58
50	5.1	5.8	5.6	4.8	4.8	5.3	6.3	6.8	5.5	7.0	8.4	6.6	6.1
	1.62	1.94	1.88	1.67	1.76	1.62	1.76	1.97	1.80	1.66	1.79	1.75	1.66
100	6.2	6.9	6.8	5.8	5.8	6.4	7.5	8.0	6.6	8.2	9.8	7.8	7.3
	1.84	2.21	2.14	1.90	2.01	1.81	1.91	2.15	2.04	1.76	1.87	1.88	1.81
200	7.4	8.5	8.2	7.1	7.1	7.7	8.9	9.5	8.0	9.6	11.3	9.2	8.7
	1.77	2.13	2.07	1.83	1.94	1.77	1.91	2.14	1.97	1.78	1.91	1.89	1.83
Freq	6.2	7.6	6.3	5.9	6.3	7.1	8.9	12.9	10.6	11.2	9.8	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	536	5.1	223	4.5	147	3.5	71
25	7.9	680	6.1	346	5.5	253	4.6	150
50	8.4	808	6.9	465	6.3	361	5.5	239
100	9.1	1014	8.0	653	7.4	515	6.5	359
200	9.9	1342	9.5	1117	8.8	871	7.8	598

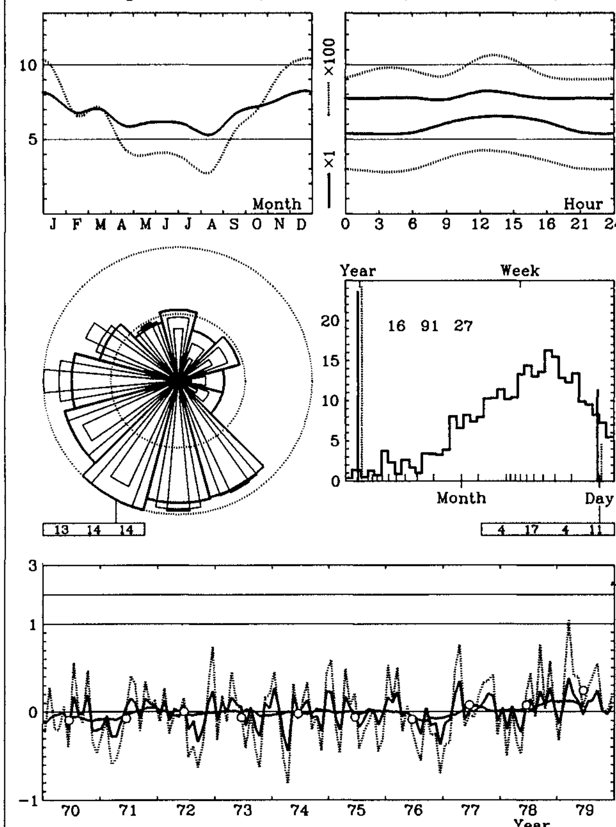
Bala, United Kingdom 1975–82

9.0 m agl, mean 3.9 m/s, st dev 2.8 m/s, cube 170. m^3/s^3



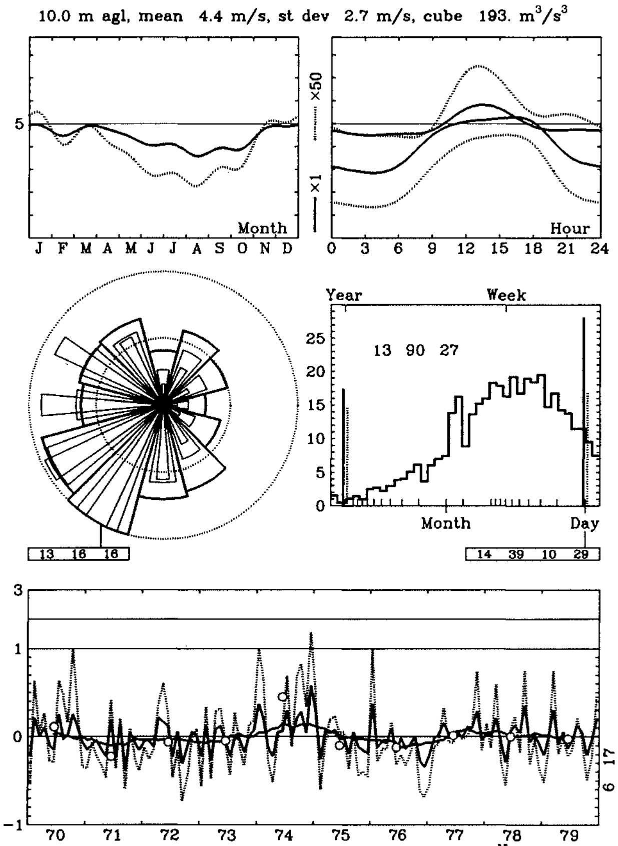
Benbecula, United Kingdom 1970–79

10.0 m agl, mean 6.7 m/s, st dev 3.7 m/s, cube 618. m^3/s^3



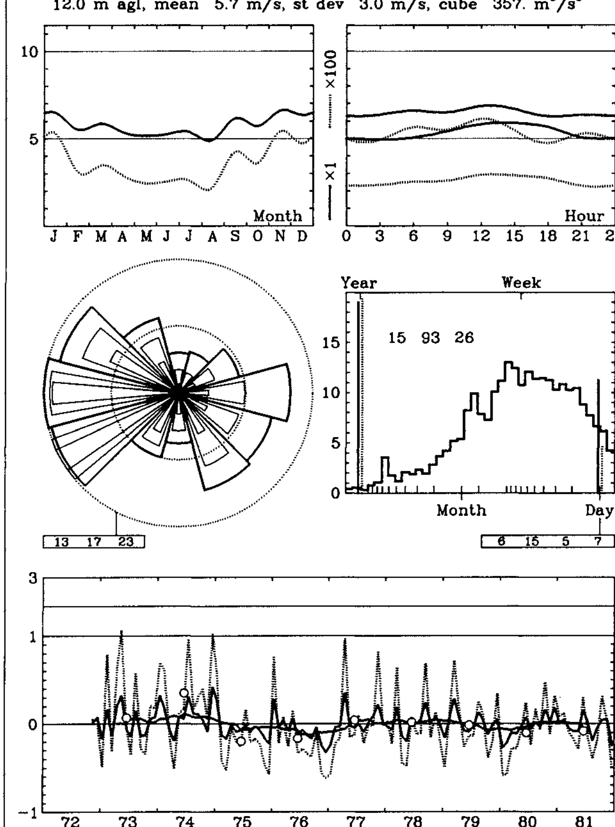
Birmingham, United Kingdom 1970–79

10.0 m agl, mean 4.4 m/s, st dev 2.7 m/s, cube 193. m^3/s^3



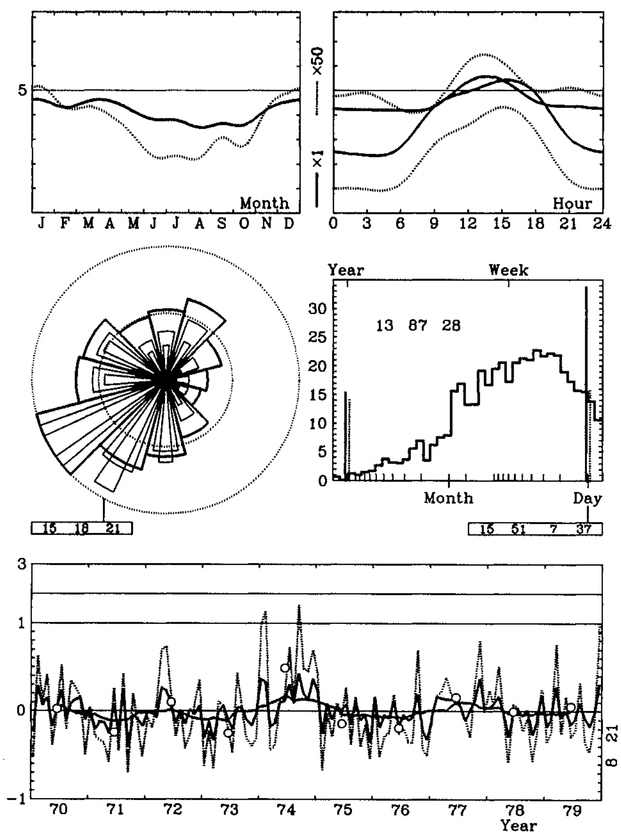
Blackpool, United Kingdom 1972–81

12.0 m agl, mean 5.7 m/s, st dev 3.0 m/s, cube 357. m^3/s^3



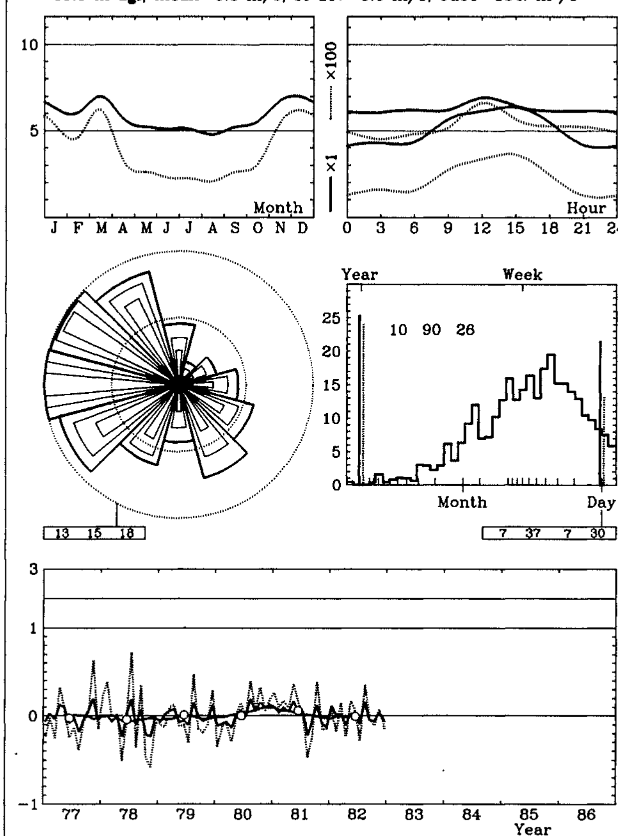
Bournemouth, United Kingdom 1970–79

13.0 m agl, mean 4.1 m/s, st dev 2.8 m/s, cube 178. m^3/s^3



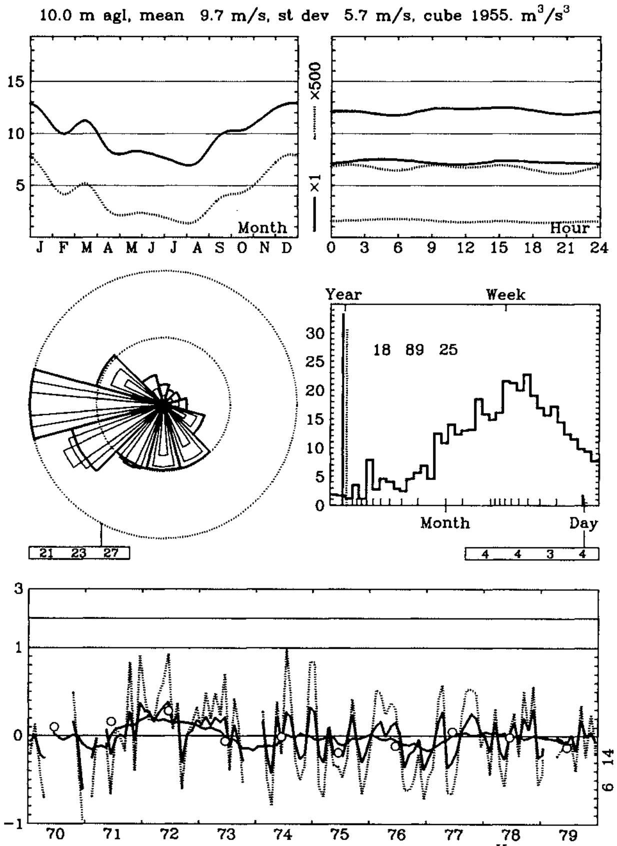
Burrington, United Kingdom 1977–82

10.0 m agl, mean 5.8 m/s, st dev 3.1 m/s, cube 382. m^3/s^3



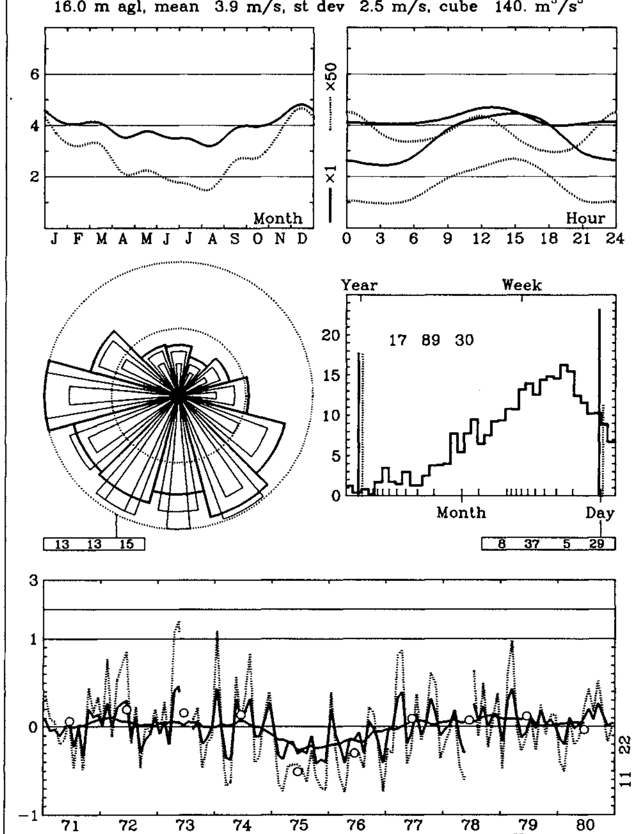
Cairngorm, United Kingdom 1970–79

10.0 m agl, mean 9.7 m/s, st dev 5.7 m/s, cube 1955. m^3/s^3



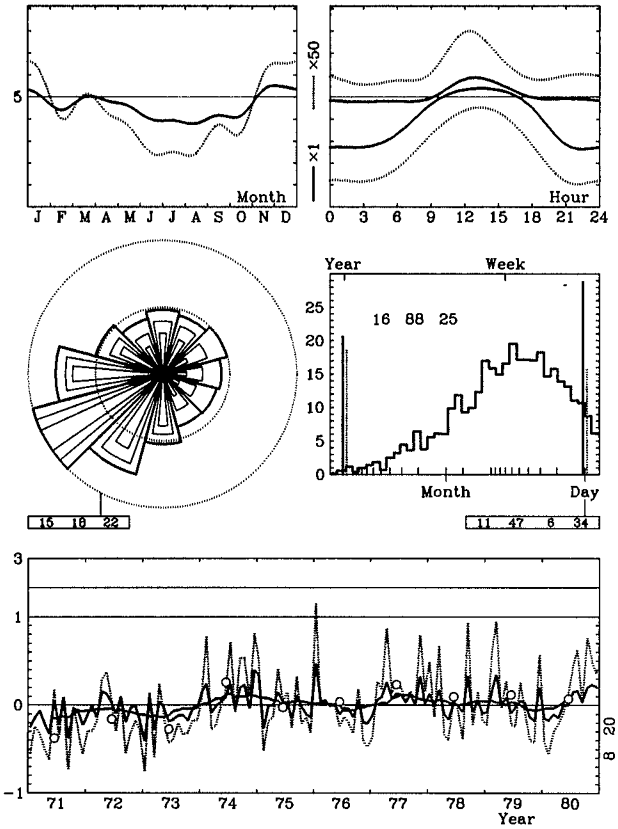
Castle Archdale, United Kingdom 1971–80

16.0 m agl, mean 3.9 m/s, st dev 2.5 m/s, cube 140. m^3/s^3



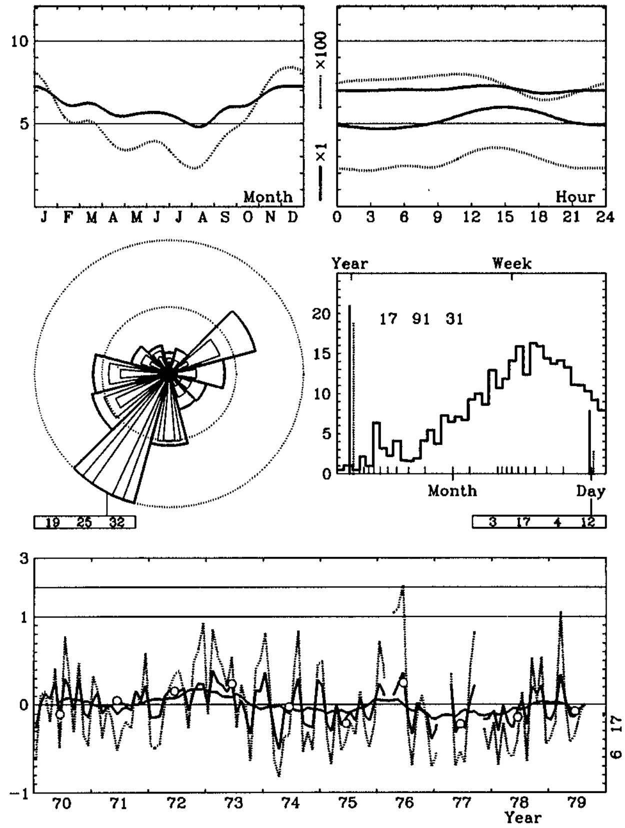
Coltishall, United Kingdom 1971–80

10.0 m agl, mean 4.6 m/s, st dev 2.8 m/s, cube 210. m^3/s^3



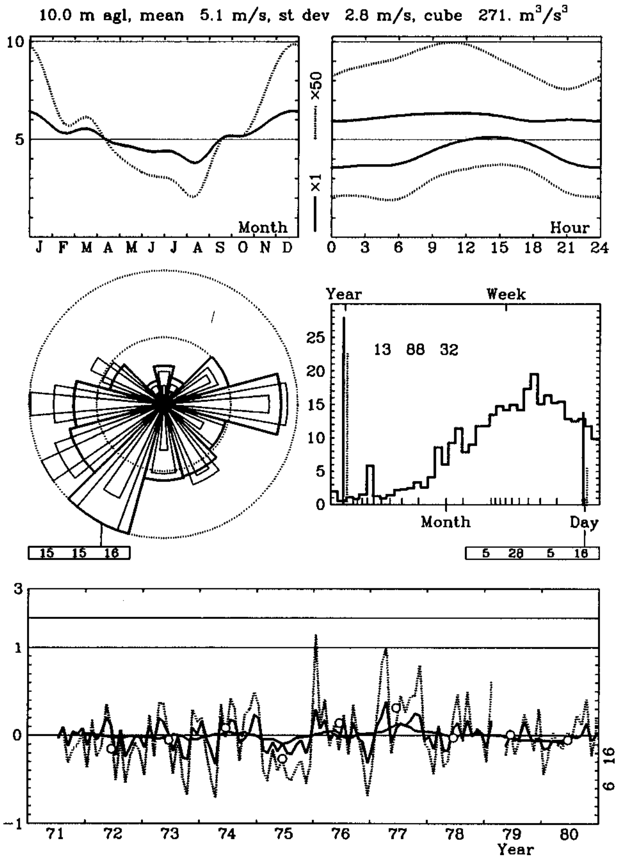
Duirinish, United Kingdom 1970–79

20.0 m agl, mean 6.1 m/s, st dev 3.6 m/s, cube 498. m^3/s^3



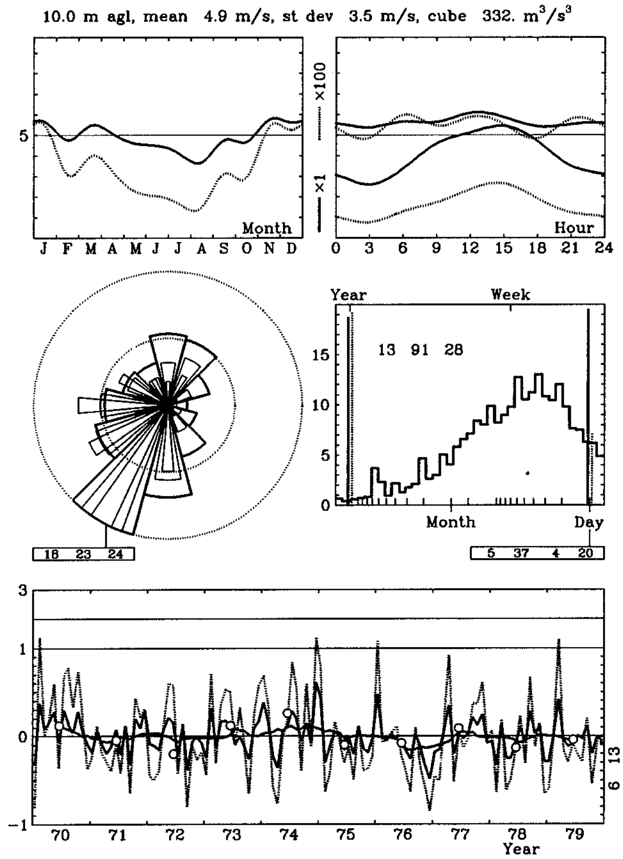
Dustaffnage, United Kingdom 1971–80

10.0 m agl, mean 5.1 m/s, st dev 2.8 m/s, cube 271. m^3/s^3



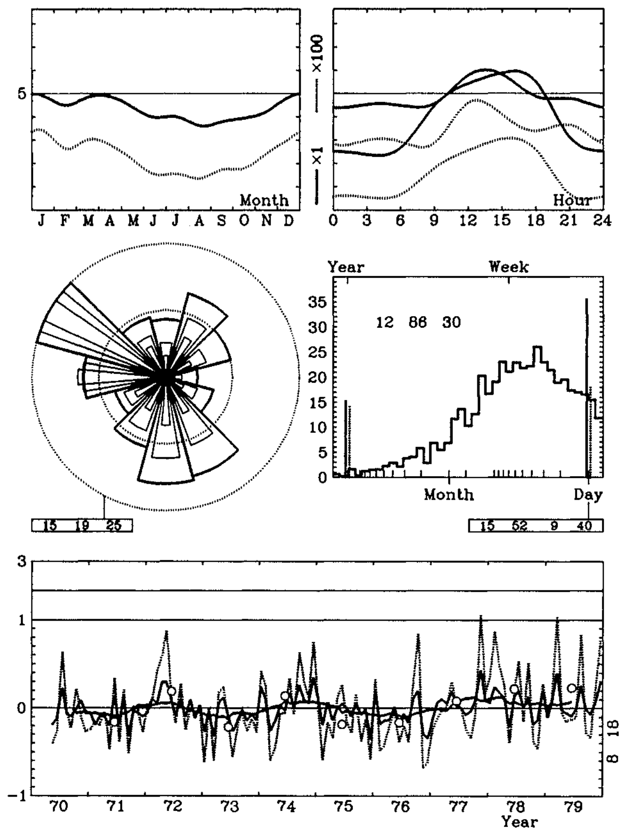
Eskdalemuir, United Kingdom 1970–79

10.0 m agl, mean 4.9 m/s, st dev 3.5 m/s, cube 332. m^3/s^3



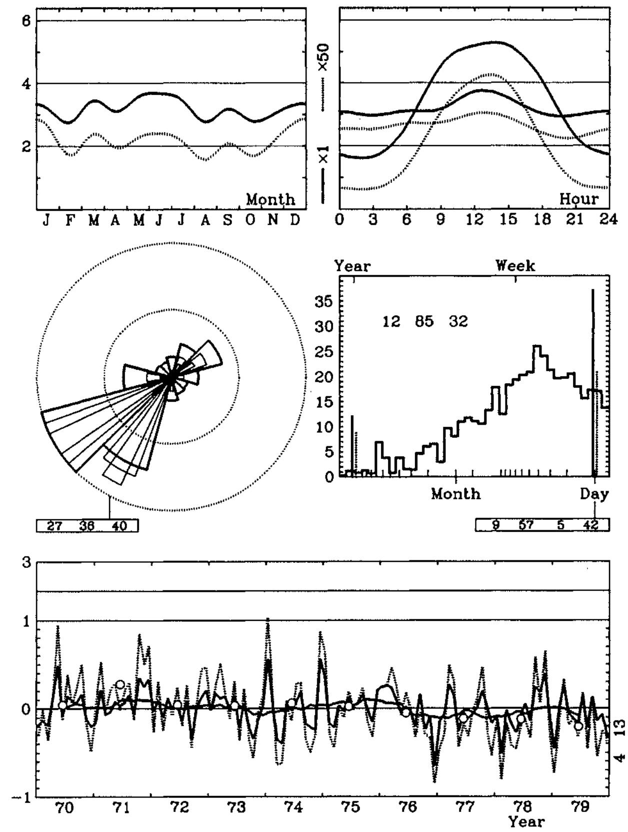
Exeter, United Kingdom 1970–79

12.0 m agl, mean 4.3 m/s, st dev 3.1 m/s, cube 227. m^3/s^3



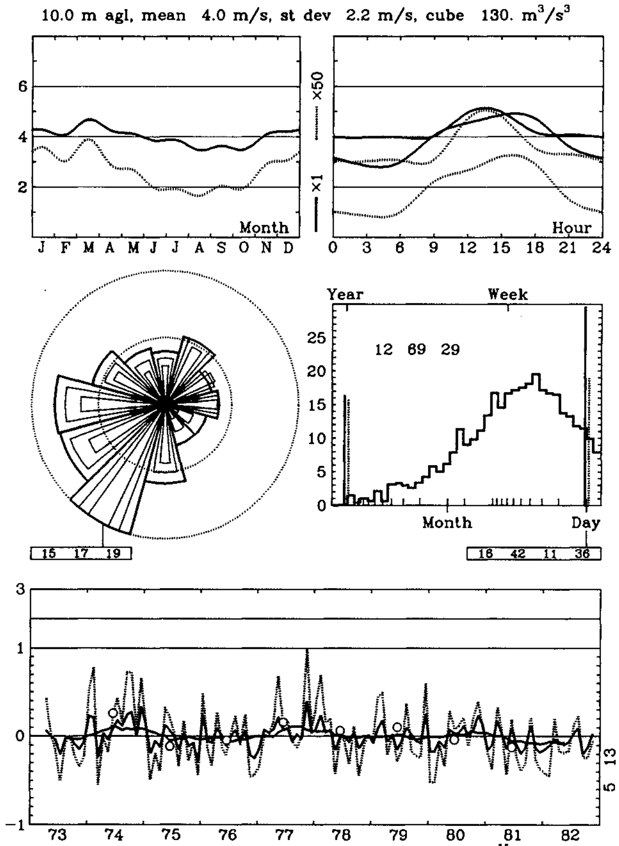
Fort Augustus, United Kingdom 1970–79

16.0 m agl, mean 3.2 m/s, st dev 2.6 m/s, cube 107. m^3/s^3



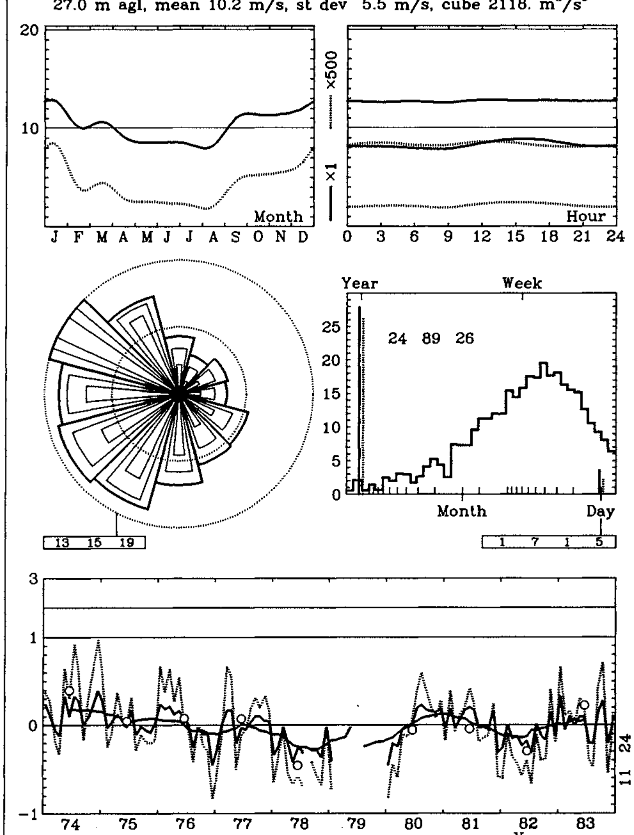
London (Heathrow), United Kingdom 1973–82

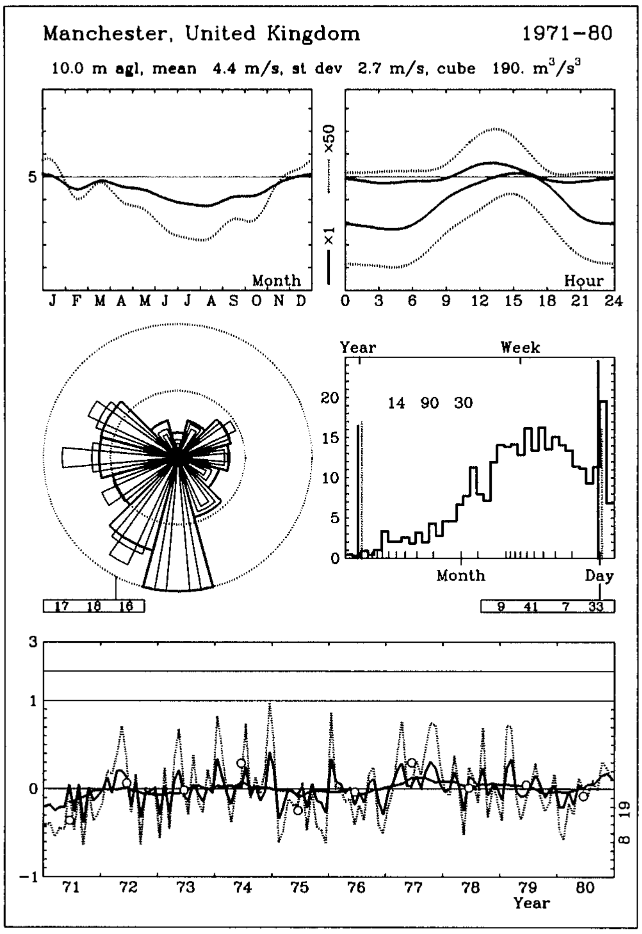
10.0 m agl, mean 4.0 m/s, st dev 2.2 m/s, cube 130. m^3/s^3

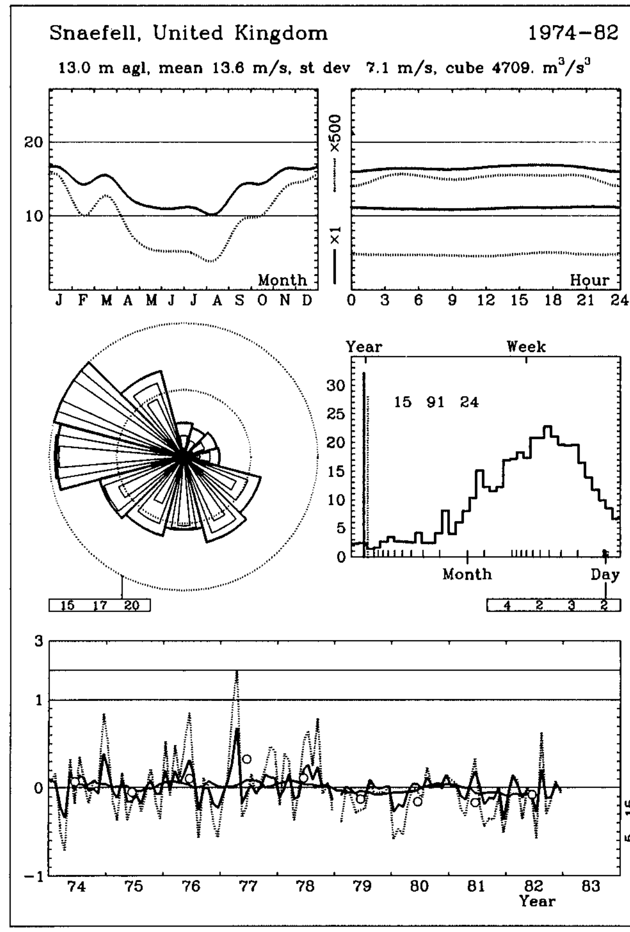


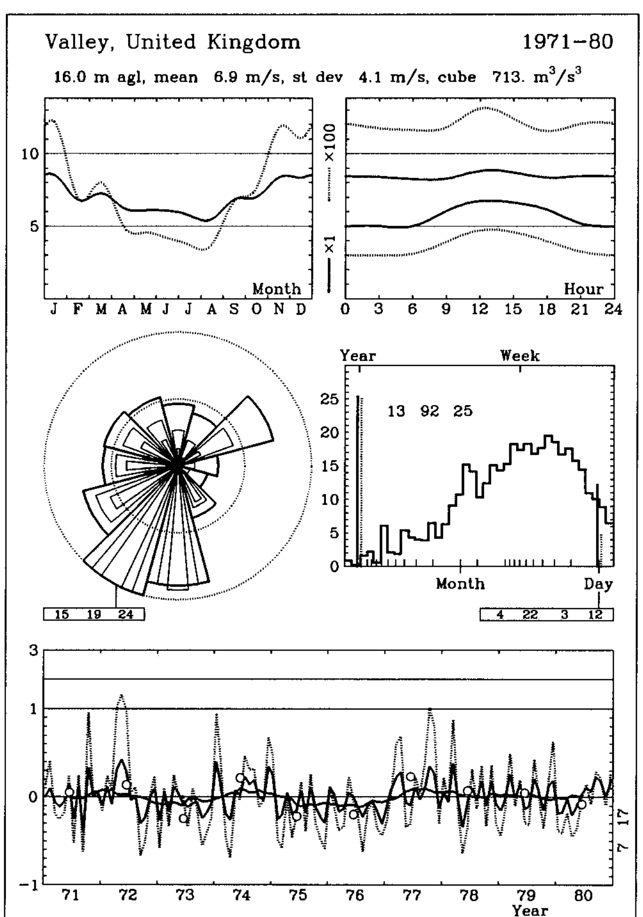
Lowther Hill, United Kingdom 1974–83

27.0 m agl, mean 10.2 m/s, st dev 5.5 m/s, cube 2118. m^3/s^3



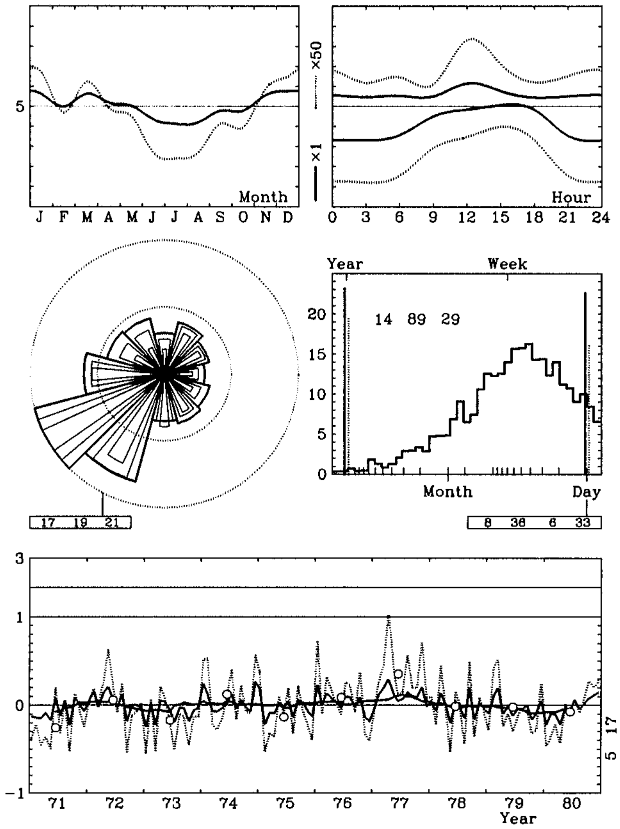

Manchester, United Kingdom 1971–80
10.0 m agl, mean 4.4 m/s, st dev 2.7 m/s, cube 190. m³/s³
Month
J F M A M J J A S O N D
×50
×1
Hour
0 3 6 9 12 15 18 21 24
Year Week
14 90 30
Month Day
17 18 16
9 41 7 33
8 19
71 72 73 74 75 76 77 78 79 80
Year


Snaefell, United Kingdom 1974–82
13.0 m agl, mean 13.6 m/s, st dev 7.1 m/s, cube 4709. m³/s³
Month
J F M A M J J A S O N D
×500
×1
Hour
0 3 6 9 12 15 18 21 24
Year Week
15 91 24
Month Day
15 17 20
4 2 3 2
5 15
74 75 76 77 78 79 80 81 82 83
Year


Valley, United Kingdom 1971–80
16.0 m agl, mean 6.9 m/s, st dev 4.1 m/s, cube 713. m³/s³
Month
J F M A M J J A S O N D
×100
×1
Hour
0 3 6 9 12 15 18 21 24
Year Week
13 92 25
Month Day
15 19 24
4 22 3 12
7 17
71 72 73 74 75 76 77 78 79 80
Year

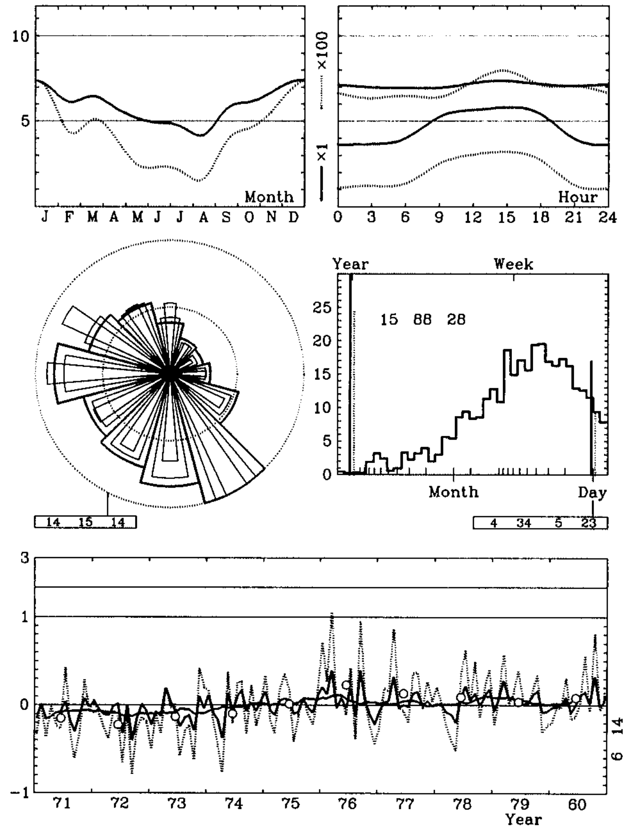
Waddington, United Kingdom 1971–80

10.0 m agl, mean 5.0 m/s, st dev 2.5 m/s, cube 231. m³/s³



Wick, United Kingdom 1971–80

10.0 m agl, mean 5.9 m/s, st dev 3.3 m/s, cube 416. m³/s³



Yeovilton, United Kingdom 1971–80

12.0 m agl, mean 4.4 m/s, st dev 3.5 m/s, cube 270. m³/s³

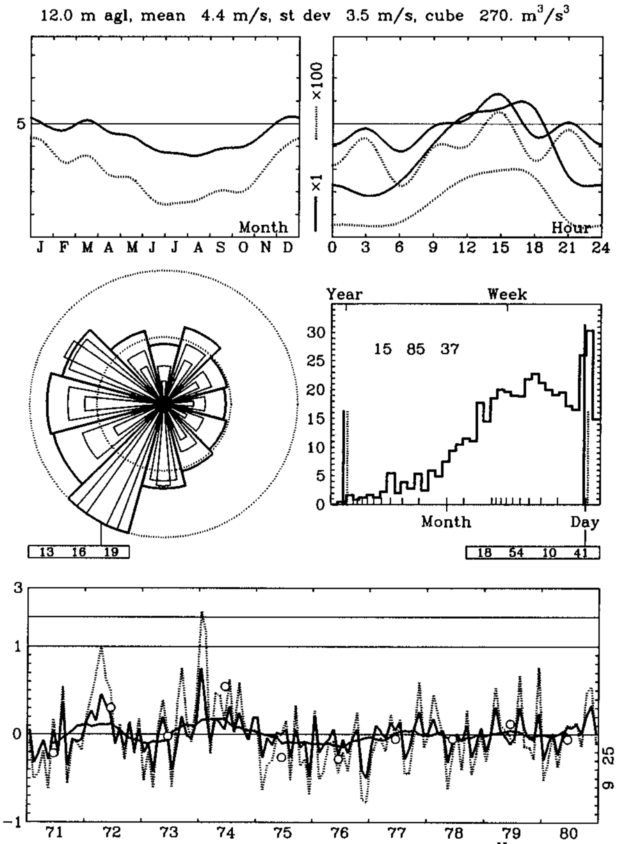


Table 7.3: Statistics for the upper-air stations analysed, see Table 7.2. The table lists statistics pertaining to the observed distributions: the Weibull parameters A and k for the total wind speed distribution, the mean wind speed, the mean square, and the mean cube of the wind speed. Subscripts 'd' and 'e' refer to values calculated from the observed frequency distribution and from the Weibull parameters, respectively.

	A	k	$\bar{u}_d$	$\bar{u}_e$	$\overline{u_d^2}$	$\overline{u_e^2}$	$\overline{u_d^3}$	$\overline{u_e^3}$
	ms^{-1}		ms^{-1}	ms^{-1}	m^2s^{-2}	m^2s^{-2}	m^3s^{-3}	m^3s^{-3}
Belgium								
Ukkel	10.9	1.79	9.9	9.7	127.0	126.4	1986	1984
Denmark								
Risø	11.4	1.72	10.3	10.2	141.5	141.5	2402	2401
France								
Ajaccio	6.3	1.45	6.0	5.7	50.0	48.6	533	533
Bordeaux	10.2	1.63	9.4	9.1	116.9	115.3	1820	1819
Brest	12.4	1.86	11.2	11.0	159.7	157.9	2725	2723
Lyon	10.0	1.58	9.3	8.9	114.9	113.4	1806	1805
Nancy	10.7	1.64	9.9	9.5	128.0	126.3	2075	2073
Nantes	11.2	1.84	10.2	9.9	131.2	129.5	2036	2034
Nîmes	10.9	1.69	10.0	9.7	131.1	128.9	2108	2107
Toulouse	8.9	1.48	8.4	8.0	95.9	94.7	1432	1431
Trappes	11.6	1.77	10.7	10.4	146.2	144.1	2435	2433
Germany (FRG)								
Emden	11.4	1.82	10.1	10.1	136.5	136.3	2210	2208
Essen	10.6	1.61	9.6	9.5	127.8	126.8	2114	2112
Hannover	10.8	1.63	9.9	9.7	133.6	131.2	2207	2205
München	8.0	1.26	7.7	7.5	93.5	91.7	1526	1525
Schleswig	11.8	1.77	10.5	10.5	146.8	146.7	2501	2499
Stuttgart	8.7	1.40	8.1	7.9	96.6	95.4	1498	1498
Greece								
Athina	9.0	1.65	8.4	8.0	91.7	89.6	1238	1237
Heraklion	11.6	1.77	10.4	10.3	143.8	143.7	2423	2421
Ireland								
Valentia	13.6	2.07	11.8	12.0	180.5	182.1	3223	3221
Italy								
Brindisi	9.2	1.58	8.4	8.2	96.4	95.9	1402	1401
Cagliari	9.4	1.58	8.3	8.4	100.7	101.2	1523	1522
Roma	7.5	1.53	7.0	6.8	66.9	66.4	823	823
Udine	6.2	1.44	5.8	5.6	47.3	47.7	521	521
United Kingdom								
Aughton	12.5	1.79	11.1	11.1	164.6	165.6	2984	2982
Camborne	12.7	1.87	11.2	11.3	164.7	166.3	2941	2939
Crawley	12.3	1.78	11.0	10.9	160.1	160.2	2848	2846
Hemsby	11.9	1.78	10.6	10.6	148.4	149.2	2557	2555
Lerwick	13.0	1.87	11.4	11.5	172.3	173.4	3131	3129
Stornoway	13.1	1.81	11.6	11.7	179.9	180.6	3376	3373

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	6.7	6.6	6.3	6.0	7.1	8.2	9.5	9.8	9.1	8.0	7.0	8.1
	2.15	2.10	2.06	2.09	2.00	1.74	1.88	2.13	2.23	2.20	2.15	2.13	1.96
25	7.3	7.3	7.2	6.8	6.6	7.7	9.0	10.4	10.6	9.9	8.7	7.7	8.9
	2.21	2.17	2.13	2.16	2.06	1.79	1.93	2.17	2.28	2.26	2.22	2.20	2.00
50	7.9	7.8	7.8	7.3	7.1	8.3	9.6	11.1	11.4	10.6	9.4	8.2	9.5
	2.27	2.22	2.19	2.22	2.12	1.84	1.99	2.23	2.34	2.32	2.28	2.26	2.05
100	8.6	8.5	8.4	8.0	7.7	9.0	10.4	11.9	12.2	11.5	10.2	8.9	10.3
	2.20	2.15	2.12	2.15	2.05	1.78	1.93	2.18	2.29	2.26	2.21	2.19	2.01
200	9.4	9.4	9.3	8.8	8.5	9.9	11.4	13.0	13.3	12.6	11.3	9.8	11.2
	2.08	2.04	2.01	2.03	1.94	1.69	1.84	2.10	2.20	2.15	2.09	2.07	1.94
Freq	5.4	5.8	5.9	5.0	4.7	6.4	9.1	14.2	15.6	12.5	8.9	6.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.7	4.6	4.3	4.2	5.1	5.8	6.9	6.8	6.2	5.3	4.8	5.7
	1.83	1.75	1.73	1.74	1.62	1.49	1.65	1.93	1.93	1.88	1.77	1.81	1.70
25	5.6	5.6	5.5	5.1	5.0	6.1	7.0	8.2	8.0	7.4	6.3	5.8	6.8
	1.97	1.89	1.87	1.88	1.75	1.61	1.76	2.03	2.04	2.01	1.91	1.96	1.81
50	6.5	6.5	6.3	5.9	5.8	7.2	8.0	9.3	9.2	8.5	7.3	6.8	7.8
	2.22	2.12	2.10	2.12	1.97	1.81	1.94	2.18	2.20	2.24	2.15	2.20	1.98
100	7.7	7.7	7.5	7.1	6.9	8.5	9.4	10.7	10.6	10.0	8.7	8.0	9.1
	2.36	2.26	2.23	2.25	2.10	1.92	2.07	2.35	2.37	2.39	2.29	2.34	2.12
200	9.5	9.6	9.4	8.8	8.6	10.6	11.5	12.7	12.7	12.3	10.8	10.0	11.1
	2.25	2.16	2.13	2.15	2.00	1.84	1.99	2.26	2.28	2.29	2.19	2.23	2.07
Freq	5.2	6.2	5.7	4.8	4.8	7.1	9.8	15.9	14.9	11.8	7.9	6.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.1	4.0	3.7	3.7	4.5	5.1	6.1	5.9	5.3	4.5	4.2	4.9
	1.80	1.74	1.73	1.77	1.63	1.51	1.66	1.96	1.93	1.88	1.77	1.78	1.71
25	5.0	5.1	4.9	4.6	4.5	5.6	6.3	7.4	7.2	6.6	5.6	5.2	6.1
	1.93	1.86	1.85	1.89	1.75	1.61	1.76	2.05	2.02	2.00	1.90	1.90	1.79
50	5.8	5.9	5.8	5.4	5.3	6.6	7.4	8.6	8.3	7.7	6.6	6.1	7.1
	2.13	2.06	2.05	2.09	1.94	1.78	1.90	2.18	2.17	2.19	2.10	2.11	1.94
100	7.0	7.1	6.9	6.5	6.4	7.9	8.7	9.9	9.7	9.1	7.8	7.3	8.4
	2.35	2.26	2.25	2.30	2.13	1.96	2.09	2.39	2.38	2.41	2.31	2.32	2.13
200	8.6	8.7	8.5	8.0	7.8	9.8	10.5	11.8	11.6	11.2	9.6	9.0	10.2
	2.24	2.16	2.15	2.20	2.03	1.87	2.01	2.31	2.30	2.31	2.21	2.22	2.08
Freq	5.1	6.3	5.6	4.7	4.8	7.3	10.0	16.5	14.6	11.5	7.6	6.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.2	3.1	2.9	2.9	3.6	4.1	4.8	4.6	4.2	3.4	3.3	3.9
	1.77	1.74	1.72	1.77	1.61	1.54	1.69	2.00	1.93	1.89	1.78	1.78	1.71
25	4.1	4.3	4.1	3.8	3.8	4.8	5.3	6.3	6.0	5.5	4.5	4.3	5.1
	1.87	1.84	1.82	1.87	1.71	1.63	1.76	2.08	2.01	2.00	1.89	1.89	1.79
50	5.0	5.2	4.9	4.6	4.6	5.8	6.4	7.5	7.2	6.6	5.5	5.3	6.1
	2.04	2.00	1.98	2.04	1.85	1.77	1.89	2.19	2.13	2.16	2.05	2.05	1.91
100	6.0	6.2	5.9	5.6	5.6	7.1	7.7	8.9	8.5	7.9	6.6	6.3	7.4
	2.32	2.28	2.25	2.32	2.11	2.01	2.12	2.40	2.36	2.46	2.34	2.34	2.12
200	7.3	7.6	7.3	6.8	6.8	8.6	9.3	10.6	10.2	9.7	8.1	7.8	8.9
	2.23	2.20	2.17	2.23	2.03	1.94	2.06	2.39	2.33	2.37	2.25	2.25	2.10
Freq	5.1	6.3	5.4	4.6	4.9	7.6	10.4	17.1	14.2	11.1	7.1	6.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	443	5.0	180	4.4	119	3.5	57
25	7.9	565	6.0	282	5.4	207	4.5	122
50	8.4	679	6.9	388	6.3	300	5.4	198
100	9.1	873	8.1	584	7.4	451	6.5	306
200	10.0	1197	9.9	1087	9.0	824	7.9	544

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.5	6.6	7.3	7.9	8.3	8.4	8.8	9.2	9.3	9.3	8.6	6.9	8.3
	1.48	1.62	1.91	2.08	2.09	1.99	1.85	1.90	1.90	1.87	1.74	1.52	1.81
25	7.2	7.2	8.0	8.7	9.0	9.2	9.6	10.0	10.1	10.2	9.4	7.5	9.1
	1.52	1.67	1.97	2.15	2.16	2.04	1.88	1.94	1.93	1.90	1.78	1.56	1.85
50	7.7	7.8	8.6	9.3	9.7	9.9	10.3	10.7	10.8	10.9	10.1	8.1	9.8
	1.57	1.72	2.02	2.20	2.22	2.10	1.94	1.99	1.98	1.95	1.83	1.60	1.90
100	8.3	8.4	9.3	10.1	10.5	10.6	11.0	11.5	11.6	11.6	10.8	8.7	10.5
	1.52	1.67	1.96	2.13	2.15	2.04	1.90	1.96	1.95	1.92	1.79	1.56	1.87
200	9.1	9.2	10.3	11.2	11.6	11.7	12.0	12.5	12.5	12.6	11.7	9.5	11.5
	1.44	1.58	1.86	2.02	2.03	1.94	1.83	1.88	1.88	1.86	1.73	1.48	1.80
Freq	4.7	5.1	6.7	8.6	9.4	8.9	9.1	10.3	11.4	11.8	8.6	5.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	4.5	5.2	5.6	5.8	5.9	6.3	6.5	6.5	6.6	5.6	4.6	5.8
	1.27	1.41	1.64	1.77	1.76	1.66	1.62	1.70	1.66	1.66	1.45	1.29	1.58
25	5.4	5.4	6.2	6.7	6.9	7.0	7.4	7.7	7.7	7.8	6.7	5.6	7.0
	1.37	1.52	1.77	1.91	1.90	1.77	1.70	1.78	1.74	1.73	1.53	1.38	1.67
50	6.4	6.4	7.3	7.8	8.0	8.1	8.5	8.8	8.8	8.9	7.7	6.5	8.0
	1.53	1.71	1.99	2.15	2.13	1.95	1.83	1.91	1.86	1.85	1.65	1.53	1.82
100	7.6	7.6	8.6	9.2	9.5	9.4	9.8	10.1	10.1	10.2	8.9	7.7	9.3
	1.63	1.81	2.12	2.29	2.27	2.09	1.96	2.05	1.99	1.99	1.77	1.63	1.96
200	9.4	9.4	10.7	11.5	11.9	11.5	11.6	12.0	11.8	11.9	10.6	9.5	11.3
	1.56	1.73	2.03	2.19	2.17	2.00	1.90	1.98	1.93	1.92	1.71	1.56	1.90
Freq	4.6	5.3	7.2	9.1	9.5	8.6	9.4	10.5	11.7	11.7	7.3	5.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.9	3.9	4.6	4.9	5.1	5.1	5.5	5.7	5.7	5.8	4.7	3.9	5.1
	1.27	1.43	1.68	1.77	1.77	1.65	1.64	1.72	1.68	1.68	1.42	1.26	1.58
25	4.8	4.9	5.7	6.0	6.3	6.3	6.8	7.0	7.0	7.1	5.8	4.9	6.3
	1.35	1.53	1.80	1.89	1.89	1.74	1.71	1.79	1.74	1.74	1.49	1.34	1.67
50	5.8	5.8	6.7	7.1	7.3	7.3	7.8	8.1	8.0	8.1	6.8	5.8	7.3
	1.49	1.69	1.99	2.09	2.09	1.89	1.81	1.91	1.85	1.84	1.60	1.47	1.79
100	6.9	7.0	8.0	8.4	8.8	8.7	9.1	9.4	9.3	9.4	8.0	7.0	8.6
	1.63	1.86	2.19	2.30	2.30	2.08	1.99	2.09	2.02	2.01	1.75	1.61	1.97
200	8.5	8.6	9.9	10.4	10.8	10.5	10.8	11.1	11.0	11.1	9.5	8.5	10.3
	1.56	1.77	2.09	2.20	2.20	2.00	1.92	2.02	1.96	1.95	1.69	1.55	1.92
Freq	4.6	5.3	7.4	9.2	9.5	8.5	9.5	10.6	11.8	11.7	6.8	5.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.1	3.7	3.8	4.0	4.0	4.4	4.5	4.5	4.6	3.5	3.0	4.0
	1.26	1.47	1.73	1.77	1.77	1.63	1.65	1.74	1.69	1.70	1.38	1.26	1.59
25	4.0	4.1	4.9	5.1	5.3	5.3	5.7	5.9	5.9	6.0	4.6	4.1	5.3
	1.33	1.55	1.83	1.87	1.88	1.71	1.71	1.80	1.75	1.76	1.44	1.33	1.66
50	4.9	5.0	5.9	6.1	6.4	6.3	6.8	7.0	7.0	7.1	5.6	4.9	6.3
	1.44	1.69	1.99	2.04	2.03	1.82	1.79	1.90	1.83	1.84	1.53	1.44	1.77
100	6.0	6.1	7.1	7.4	7.7	7.6	8.1	8.3	8.3	8.4	6.7	6.0	7.6
	1.63	1.92	2.27	2.32	2.31	2.04	1.96	2.07	1.99	1.99	1.71	1.63	1.96
200	7.3	7.4	8.7	9.1	9.4	9.1	9.6	9.9	9.8	9.9	8.1	7.3	9.1
	1.57	1.85	2.19	2.23	2.23	1.99	1.95	2.06	1.99	2.00	1.67	1.57	1.94
Freq	4.7	5.5	7.7	9.4	9.4	8.4	9.7	10.7	11.9	11.6	6.2	4.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	531	5.2	222	4.6	146	3.6	70
25	8.1	674	6.2	344	5.6	252	4.7	149
50	8.7	803	7.1	464	6.5	360	5.6	238
100	9.3	1028	8.3	675	7.6	524	6.7	360
200	10.2	1400	10.0	1227	9.2	939	8.0	627

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.6	3.7	4.1	4.4	4.6	4.9	5.0	5.5	5.8	5.2	4.2	4.8
	1.55	1.60	1.53	1.53	1.53	1.56	1.59	1.60	1.77	1.74	1.58	1.51	1.57
25	4.2	4.0	4.1	4.5	4.8	5.0	5.4	5.5	6.1	6.3	5.7	4.6	5.3
	1.60	1.65	1.58	1.58	1.58	1.61	1.64	1.65	1.83	1.79	1.62	1.56	1.62
50	4.5	4.3	4.4	4.9	5.2	5.4	5.8	5.9	6.5	6.8	6.1	4.9	5.7
	1.64	1.70	1.62	1.62	1.62	1.65	1.68	1.69	1.88	1.84	1.67	1.60	1.65
100	4.9	4.6	4.8	5.3	5.6	5.8	6.3	6.4	7.1	7.3	6.6	5.3	6.1
	1.59	1.64	1.57	1.57	1.57	1.60	1.63	1.64	1.81	1.78	1.62	1.55	1.60
200	5.3	5.1	5.2	5.8	6.2	6.4	6.9	7.1	7.8	8.1	7.3	5.8	6.8
	1.51	1.56	1.49	1.49	1.49	1.52	1.54	1.55	1.72	1.69	1.53	1.47	1.53
Freq	5.8	4.7	4.5	5.3	6.7	8.0	8.4	9.1	12.4	15.2	12.1	7.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	2.5	2.7	2.9	3.0	3.2	3.5	3.5	4.0	4.0	3.4	2.7	3.3
	1.39	1.44	1.32	1.29	1.30	1.33	1.36	1.36	1.54	1.44	1.34	1.26	1.35
25	3.3	3.1	3.2	3.5	3.7	3.8	4.2	4.2	4.8	4.8	4.1	3.3	4.0
	1.50	1.56	1.42	1.38	1.40	1.43	1.47	1.47	1.67	1.56	1.44	1.35	1.45
50	3.8	3.6	3.8	4.1	4.3	4.5	5.0	4.9	5.5	5.6	4.8	3.9	4.7
	1.68	1.74	1.60	1.55	1.57	1.60	1.64	1.64	1.87	1.74	1.62	1.51	1.62
100	4.5	4.3	4.5	4.9	5.2	5.4	5.9	5.8	6.6	6.6	5.7	4.6	5.6
	1.79	1.86	1.70	1.65	1.67	1.71	1.75	1.75	1.99	1.86	1.72	1.61	1.71
200	5.6	5.3	5.6	6.1	6.4	6.7	7.3	7.2	8.2	8.2	7.1	5.8	7.0
	1.71	1.77	1.62	1.58	1.59	1.63	1.67	1.67	1.90	1.77	1.64	1.54	1.64
Freq	5.5	4.4	4.6	5.6	7.1	8.3	8.3	9.4	13.6	15.6	10.5	7.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.2	2.3	2.6	2.7	2.8	3.0	2.9	3.5	3.4	2.8	2.4	2.9
	1.38	1.37	1.31	1.37	1.32	1.35	1.31	1.31	1.54	1.41	1.31	1.29	1.34
25	2.9	2.7	2.9	3.3	3.4	3.5	3.7	3.6	4.3	4.3	3.5	3.0	3.6
	1.47	1.47	1.40	1.47	1.41	1.44	1.40	1.40	1.64	1.51	1.40	1.37	1.43
50	3.4	3.2	3.5	3.9	4.0	4.1	4.4	4.3	5.1	5.1	4.2	3.5	4.3
	1.62	1.62	1.54	1.62	1.56	1.59	1.54	1.54	1.81	1.67	1.54	1.51	1.57
100	4.1	3.8	4.2	4.6	4.8	4.9	5.3	5.2	6.1	6.1	5.1	4.3	5.1
	1.78	1.77	1.69	1.77	1.71	1.74	1.69	1.69	1.99	1.83	1.69	1.66	1.71
200	5.1	4.7	5.1	5.7	5.9	6.1	6.5	6.4	7.5	7.4	6.2	5.2	6.3
	1.71	1.70	1.62	1.70	1.64	1.67	1.62	1.62	1.91	1.75	1.62	1.59	1.64
Freq	5.4	4.3	4.7	5.7	7.3	8.4	8.3	9.6	14.1	15.7	9.9	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	1.8	1.9	2.0	2.2	2.2	2.5	2.4	2.8	2.8	2.2	1.8	2.3
	1.46	1.52	1.31	1.25	1.30	1.34	1.40	1.42	1.60	1.47	1.38	1.26	1.38
25	2.5	2.3	2.5	2.6	2.8	3.0	3.3	3.2	3.7	3.7	2.9	2.4	3.1
	1.54	1.62	1.39	1.33	1.38	1.42	1.48	1.50	1.69	1.55	1.46	1.34	1.45
50	3.0	2.8	3.0	3.2	3.5	3.6	4.0	3.9	4.4	4.4	3.5	2.9	3.7
	1.67	1.75	1.51	1.44	1.49	1.54	1.60	1.62	1.83	1.69	1.59	1.45	1.57
100	3.6	3.5	3.7	4.0	4.3	4.4	4.9	4.7	5.4	5.4	4.3	3.6	4.6
	1.90	1.99	1.71	1.63	1.70	1.75	1.82	1.85	2.09	1.92	1.80	1.65	1.77
200	4.4	4.2	4.5	4.8	5.2	5.4	5.9	5.8	6.6	6.6	5.2	4.4	5.6
	1.83	1.92	1.65	1.57	1.63	1.69	1.76	1.78	2.01	1.85	1.74	1.59	1.71
Freq	5.3	4.2	4.8	5.9	7.4	8.4	8.5	9.8	14.6	15.5	9.2	6.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.3	125	3.0	55	2.6	37	2.1	17
25	4.7	158	3.6	84	3.3	62	2.8	37
50	5.1	190	4.2	112	3.8	88	3.4	59
100	5.5	253	5.0	175	4.6	133	4.1	89
200	6.1	366	6.2	354	5.6	263	5.0	169

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.5	6.4	5.9	5.5	5.4	6.0	7.3	8.1	8.7	8.7	7.8	6.6	7.4
	2.27	2.20	2.00	1.83	1.90	1.60	1.72	1.81	1.84	1.81	1.77	2.01	1.74
25	7.1	7.0	6.5	6.0	5.9	6.6	8.1	8.8	9.5	9.5	8.5	7.3	8.1
	2.34	2.27	2.06	1.89	1.96	1.65	1.77	1.86	1.88	1.85	1.83	2.07	1.78
50	7.6	7.5	6.9	6.4	6.3	7.1	8.7	9.5	10.2	10.1	9.2	7.8	8.7
	2.40	2.33	2.12	1.94	2.01	1.69	1.82	1.91	1.93	1.90	1.88	2.13	1.83
100	8.2	8.1	7.5	7.0	6.8	7.7	9.4	10.2	10.9	10.9	9.9	8.5	9.4
	2.33	2.26	2.05	1.88	1.94	1.64	1.76	1.86	1.89	1.86	1.82	2.06	1.79
200	9.1	9.0	8.3	7.7	7.6	8.4	10.3	11.2	11.9	11.8	10.8	9.3	10.3
	2.20	2.13	1.94	1.78	1.84	1.55	1.67	1.78	1.82	1.79	1.74	1.95	1.72
Freq	6.8	6.1	4.4	3.7	3.8	5.2	8.9	12.7	16.2	15.2	9.9	6.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.4	4.0	3.8	3.8	4.3	5.2	5.7	6.2	6.0	5.1	4.5	5.2
	1.93	1.79	1.63	1.58	1.68	1.36	1.48	1.59	1.62	1.56	1.51	1.74	1.51
25	5.5	5.3	4.8	4.6	4.5	5.2	6.2	6.8	7.4	7.1	6.2	5.4	6.2
	2.08	1.94	1.76	1.71	1.81	1.46	1.59	1.69	1.71	1.65	1.63	1.88	1.60
50	6.3	6.1	5.6	5.4	5.2	6.0	7.3	7.9	8.4	8.1	7.2	6.3	7.2
	2.34	2.18	1.98	1.92	2.04	1.64	1.77	1.85	1.83	1.78	1.83	2.12	1.76
100	7.5	7.2	6.6	6.4	6.2	7.2	8.6	9.2	9.7	9.4	8.6	7.5	8.4
	2.49	2.32	2.11	2.04	2.17	1.74	1.89	1.99	1.97	1.91	1.95	2.25	1.89
200	9.3	9.0	8.2	7.9	7.7	8.9	10.6	11.2	11.5	11.2	10.6	9.3	10.3
	2.38	2.21	2.01	1.95	2.07	1.67	1.81	1.91	1.90	1.84	1.86	2.15	1.84
Freq	6.9	5.7	4.0	3.8	3.9	5.8	10.1	13.4	17.2	14.0	8.6	6.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	3.8	3.5	3.3	3.2	3.8	4.6	5.0	5.5	5.1	4.4	3.9	4.5
	1.92	1.83	1.69	1.58	1.65	1.36	1.52	1.56	1.64	1.55	1.53	1.77	1.51
25	4.9	4.7	4.3	4.2	4.0	4.7	5.7	6.1	6.7	6.3	5.5	4.8	5.6
	2.05	1.96	1.81	1.69	1.76	1.45	1.62	1.65	1.72	1.62	1.63	1.90	1.60
50	5.8	5.5	5.1	4.9	4.7	5.6	6.7	7.1	7.8	7.3	6.4	5.7	6.5
	2.27	2.16	2.01	1.87	1.95	1.60	1.78	1.79	1.83	1.74	1.81	2.10	1.73
100	6.8	6.6	6.1	5.9	5.6	6.7	8.0	8.4	9.0	8.6	7.7	6.8	7.7
	2.50	2.38	2.20	2.05	2.14	1.75	1.96	1.96	2.01	1.90	1.99	2.31	1.90
200	8.5	8.1	7.5	7.2	6.9	8.2	9.8	10.1	10.7	10.2	9.5	8.4	9.4
	2.39	2.28	2.11	1.97	2.05	1.68	1.87	1.89	1.94	1.84	1.90	2.21	1.85
Freq	7.0	5.5	3.8	3.8	3.9	6.0	10.5	13.7	17.5	13.6	8.1	6.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.9	2.7	2.7	2.6	3.0	3.7	3.9	4.3	4.0	3.3	3.0	3.5
	1.94	1.72	1.64	1.73	1.77	1.37	1.57	1.58	1.66	1.53	1.56	1.80	1.53
25	4.1	3.9	3.5	3.6	3.4	4.0	4.9	5.2	5.7	5.2	4.4	4.0	4.7
	2.06	1.82	1.74	1.83	1.87	1.44	1.67	1.66	1.72	1.60	1.66	1.90	1.60
50	5.0	4.7	4.3	4.3	4.2	4.8	5.9	6.2	6.8	6.3	5.3	4.9	5.6
	2.24	1.98	1.88	1.99	2.04	1.56	1.81	1.77	1.81	1.69	1.80	2.07	1.71
100	6.0	5.7	5.2	5.2	5.0	5.9	7.1	7.4	8.1	7.5	6.5	5.9	6.8
	2.55	2.25	2.15	2.27	2.32	1.78	2.06	1.98	1.98	1.86	2.05	2.36	1.90
200	7.3	6.9	6.3	6.4	6.1	7.2	8.7	8.9	9.6	8.9	7.9	7.2	8.2
	2.45	2.17	2.07	2.19	2.23	1.72	1.98	1.94	1.97	1.84	1.98	2.27	1.88
Freq	7.0	5.3	3.7	3.8	4.0	6.4	11.0	14.1	17.8	13.0	7.6	6.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	399	4.7	167	4.1	110	3.2	53
25	7.2	506	5.5	258	5.0	189	4.2	112
50	7.8	604	6.4	348	5.8	270	5.0	178
100	8.4	780	7.5	516	6.9	397	6.0	269
200	9.2	1078	9.1	966	8.3	731	7.3	480

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	7.8	7.5	6.8	6.7	7.9	9.8	10.4	10.2	9.6	9.0	8.2	9.0
	2.37	2.38	2.22	2.19	1.97	1.73	2.04	2.20	2.15	2.06	2.11	2.23	2.01
25	8.5	8.6	8.2	7.5	7.4	8.7	10.7	11.4	11.2	10.5	9.8	9.0	9.8
	2.44	2.46	2.29	2.26	2.03	1.76	2.08	2.24	2.19	2.10	2.16	2.30	2.05
50	9.2	9.2	8.8	8.0	7.9	9.3	11.4	12.1	11.9	11.2	10.5	9.6	10.5
	2.50	2.53	2.35	2.32	2.09	1.81	2.13	2.30	2.25	2.16	2.22	2.36	2.11
100	9.9	10.0	9.5	8.7	8.6	10.0	12.2	13.0	12.8	12.0	11.4	10.4	11.3
	2.42	2.45	2.28	2.25	2.02	1.77	2.10	2.26	2.21	2.12	2.17	2.29	2.08
200	11.0	11.0	10.5	9.6	9.5	10.9	13.2	14.1	13.8	13.1	12.4	11.5	12.3
	2.30	2.31	2.15	2.13	1.91	1.69	2.03	2.19	2.14	2.05	2.07	2.16	2.01
Freq	6.7	6.4	5.6	4.6	4.4	5.5	9.0	13.3	14.7	13.0	9.5	7.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.4	5.1	4.6	4.7	5.8	7.1	7.4	7.1	6.7	6.2	5.6	6.3
	2.00	1.93	1.82	1.83	1.58	1.55	1.88	1.97	1.88	1.81	1.82	1.87	1.76
25	6.5	6.5	6.1	5.6	5.6	6.9	8.4	8.8	8.4	7.9	7.3	6.7	7.5
	2.16	2.08	1.96	1.98	1.71	1.63	1.97	2.05	1.96	1.90	1.94	2.03	1.86
50	7.5	7.5	7.0	6.4	6.5	7.9	9.5	9.9	9.5	9.0	8.4	7.7	8.5
	2.43	2.34	2.20	2.22	1.92	1.78	2.10	2.18	2.09	2.05	2.14	2.28	2.01
100	8.9	8.9	8.4	7.6	7.8	9.2	10.9	11.3	10.9	10.4	9.9	9.1	9.9
	2.58	2.49	2.35	2.37	2.04	1.91	2.26	2.34	2.25	2.20	2.30	2.42	2.17
200	11.1	11.1	10.4	9.5	9.6	11.1	12.8	13.2	12.8	12.3	12.1	11.4	11.9
	2.47	2.38	2.24	2.26	1.95	1.84	2.18	2.27	2.17	2.12	2.20	2.31	2.13
Freq	6.6	6.3	5.3	4.4	4.5	5.9	10.2	14.2	14.7	12.4	8.6	7.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	4.7	4.4	4.0	4.1	5.1	6.2	6.5	6.2	5.8	5.3	4.8	5.5
	2.07	1.97	1.84	1.84	1.59	1.55	1.89	1.98	1.87	1.82	1.84	1.91	1.77
25	5.9	5.8	5.4	5.0	5.1	6.3	7.6	7.9	7.5	7.1	6.6	6.0	6.7
	2.22	2.11	1.97	1.97	1.71	1.62	1.96	2.05	1.95	1.90	1.96	2.05	1.86
50	6.9	6.9	6.4	5.8	6.0	7.3	8.7	9.1	8.7	8.2	7.7	7.0	7.8
	2.45	2.34	2.18	2.18	1.88	1.74	2.08	2.16	2.06	2.03	2.14	2.26	1.99
100	8.2	8.2	7.6	6.9	7.2	8.6	10.1	10.5	10.0	9.5	9.1	8.3	9.1
	2.70	2.57	2.40	2.40	2.07	1.90	2.27	2.36	2.25	2.22	2.36	2.49	2.19
200	10.1	10.1	9.4	8.6	8.9	10.2	11.9	12.2	11.8	11.3	11.1	10.3	10.9
	2.58	2.46	2.30	2.30	1.98	1.84	2.20	2.29	2.18	2.15	2.26	2.38	2.15
Freq	6.5	6.3	5.2	4.3	4.6	6.0	10.6	14.5	14.6	12.1	8.2	7.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	3.7	3.4	3.1	3.3	4.1	4.9	5.1	4.8	4.5	4.1	3.8	4.3
	2.14	1.98	1.82	1.85	1.60	1.56	1.92	1.99	1.87	1.83	1.83	1.95	1.78
25	4.9	4.9	4.5	4.1	4.3	5.4	6.4	6.7	6.3	5.9	5.4	5.0	5.6
	2.27	2.10	1.93	1.96	1.69	1.62	1.99	2.05	1.93	1.90	1.94	2.06	1.85
50	6.0	5.9	5.5	5.0	5.3	6.4	7.6	7.9	7.5	7.1	6.5	6.0	6.8
	2.46	2.28	2.10	2.13	1.83	1.71	2.08	2.14	2.03	2.01	2.10	2.24	1.96
100	7.2	7.2	6.6	6.0	6.4	7.7	9.0	9.3	8.8	8.4	7.8	7.2	8.0
	2.81	2.60	2.39	2.42	2.09	1.88	2.25	2.30	2.20	2.21	2.38	2.56	2.16
200	8.8	8.8	8.1	7.3	7.8	9.1	10.6	10.9	10.4	10.0	9.5	8.9	9.6
	2.70	2.50	2.30	2.33	2.01	1.87	2.26	2.32	2.20	2.19	2.30	2.46	2.17
Freq	6.5	6.3	5.1	4.3	4.6	6.2	11.2	14.9	14.6	11.8	7.8	6.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	583	5.6	234	4.9	154	3.8	74
25	8.7	744	6.6	367	6.0	268	5.0	159
50	9.3	888	7.6	502	6.9	389	6.0	256
100	10.0	1124	8.8	731	8.1	568	7.1	393
200	10.9	1504	10.5	1287	9.7	992	8.5	671

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.3	6.5	4.3	3.9	5.5	10.0	9.2	7.6	6.9	6.8	6.7	7.1	7.4
	2.32	2.01	1.90	1.95	1.15	1.76	1.71	1.79	1.85	1.81	2.00	2.28	1.72
25	8.0	7.2	4.7	4.3	6.1	10.9	10.0	8.3	7.5	7.4	7.4	7.8	8.1
	2.39	2.07	1.96	2.01	1.18	1.78	1.73	1.85	1.91	1.87	2.06	2.35	1.76
50	8.6	7.7	5.1	4.6	6.5	11.6	10.7	8.9	8.1	8.0	7.9	8.4	8.7
	2.46	2.13	2.01	2.06	1.21	1.81	1.77	1.89	1.96	1.92	2.12	2.41	1.81
100	9.3	8.3	5.5	5.0	7.0	12.3	11.4	9.7	8.8	8.6	8.6	9.1	9.4
	2.38	2.06	1.94	2.00	1.19	1.80	1.75	1.83	1.90	1.86	2.05	2.34	1.78
200	10.3	9.2	6.1	5.5	7.5	13.2	12.3	10.6	9.7	9.5	9.5	10.0	10.3
	2.25	1.95	1.84	1.89	1.15	1.76	1.70	1.74	1.79	1.76	1.94	2.21	1.74
Freq	13.6	6.3	2.0	1.5	2.7	8.6	12.1	9.9	8.3	8.8	11.1	15.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	4.0	2.9	2.8	4.2	7.3	6.1	5.0	4.8	4.7	4.7	5.0	5.1
	1.89	1.48	1.74	1.60	1.08	1.67	1.50	1.53	1.56	1.56	1.77	1.95	1.51
25	6.0	4.8	3.5	3.4	5.0	8.6	7.2	6.0	5.7	5.7	5.6	6.0	6.1
	2.04	1.60	1.88	1.73	1.13	1.72	1.57	1.65	1.68	1.68	1.91	2.11	1.60
50	7.0	5.6	4.1	4.0	5.8	9.7	8.2	7.0	6.7	6.6	6.5	7.0	7.1
	2.30	1.79	2.12	1.94	1.21	1.80	1.67	1.85	1.89	1.89	2.15	2.37	1.75
100	8.3	6.7	4.8	4.7	6.7	11.0	9.4	8.4	7.9	7.8	7.8	8.3	8.4
	2.44	1.91	2.25	2.07	1.29	1.93	1.80	1.97	2.01	2.01	2.29	2.53	1.90
200	10.3	8.3	6.0	5.9	7.9	12.6	11.1	10.4	9.9	9.7	9.6	10.3	10.2
	2.33	1.82	2.15	1.98	1.25	1.88	1.74	1.88	1.92	1.92	2.19	2.41	1.88
Freq	12.1	4.3	1.6	1.5	3.2	10.7	12.0	9.2	8.1	9.1	11.8	16.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	3.3	2.4	2.4	3.7	6.4	5.1	4.3	4.1	4.0	4.1	4.4	4.5
	1.91	1.43	1.69	1.59	1.08	1.68	1.50	1.55	1.53	1.52	1.76	1.97	1.51
25	5.4	4.1	3.0	3.0	4.6	7.8	6.3	5.3	5.1	5.0	5.0	5.5	5.5
	2.05	1.52	1.81	1.70	1.12	1.73	1.56	1.66	1.63	1.62	1.88	2.11	1.59
50	6.3	4.8	3.5	3.5	5.3	8.9	7.3	6.3	6.0	5.9	5.9	6.4	6.5
	2.26	1.69	2.01	1.88	1.18	1.79	1.66	1.83	1.81	1.79	2.08	2.34	1.71
100	7.6	5.8	4.2	4.3	6.3	10.2	8.5	7.5	7.2	7.1	7.1	7.6	7.7
	2.49	1.85	2.20	2.06	1.28	1.93	1.82	2.01	1.99	1.97	2.29	2.57	1.88
200	9.3	7.1	5.2	5.2	7.3	11.8	10.1	9.3	8.8	8.7	8.7	9.4	9.3
	2.38	1.77	2.11	1.98	1.24	1.90	1.76	1.93	1.90	1.89	2.19	2.46	1.87
Freq	11.6	3.6	1.5	1.6	3.4	11.5	11.9	9.0	8.1	9.2	12.1	16.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	2.3	1.9	2.0	3.0	5.2	3.9	3.3	3.2	3.2	3.2	3.5	3.5
	1.94	1.46	1.99	1.64	1.12	1.75	1.52	1.60	1.52	1.55	1.79	2.05	1.54
25	4.6	3.0	2.5	2.7	4.0	6.7	5.2	4.4	4.2	4.2	4.2	4.7	4.6
	2.06	1.54	2.12	1.74	1.15	1.79	1.59	1.70	1.62	1.64	1.90	2.18	1.60
50	5.5	3.6	3.0	3.2	4.8	7.9	6.2	5.3	5.1	5.1	5.1	5.6	5.6
	2.24	1.67	2.30	1.88	1.21	1.85	1.68	1.84	1.75	1.78	2.06	2.37	1.71
100	6.6	4.4	3.7	3.9	5.8	9.3	7.4	6.4	6.2	6.2	6.2	6.8	6.7
	2.55	1.90	2.62	2.15	1.31	1.96	1.86	2.10	1.99	2.03	2.35	2.70	1.89
200	8.1	5.4	4.5	4.8	6.8	10.8	8.9	7.8	7.6	7.6	7.5	8.3	8.1
	2.45	1.83	2.53	2.07	1.31	1.99	1.84	2.02	1.92	1.95	2.26	2.60	1.90
Freq	10.7	2.8	1.4	1.7	3.8	12.5	11.7	8.6	8.1	9.5	12.4	16.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.6	393	4.6	163	4.0	107	3.2	51
25	7.2	500	5.5	253	4.9	185	4.2	109
50	7.7	599	6.3	343	5.8	266	5.0	175
100	8.3	765	7.4	503	6.8	390	6.0	266
200	9.1	1045	9.0	920	8.2	700	7.2	465

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.1	6.9	7.1	6.3	4.9	6.1	8.1	9.1	9.2	8.5	7.1	6.1	7.8
	2.15	2.22	2.15	1.80	1.65	1.60	1.77	1.92	1.90	1.81	1.79	1.98	1.77
25	6.6	7.5	7.8	6.9	5.4	6.7	8.9	10.0	10.1	9.3	7.8	6.7	8.6
	2.21	2.29	2.22	1.86	1.70	1.64	1.82	1.96	1.93	1.85	1.85	2.04	1.81
50	7.1	8.1	8.4	7.5	5.8	7.2	9.6	10.7	10.8	9.9	8.4	7.2	9.2
	2.27	2.35	2.28	1.91	1.75	1.69	1.87	2.02	1.98	1.90	1.90	2.10	1.86
100	7.7	8.7	9.1	8.1	6.3	7.8	10.3	11.4	11.5	10.7	9.1	7.8	9.9
	2.20	2.28	2.21	1.85	1.69	1.63	1.82	1.98	1.95	1.86	1.84	2.03	1.82
200	8.6	9.7	10.0	8.9	6.9	8.6	11.2	12.4	12.5	11.6	10.0	8.6	10.8
	2.08	2.15	2.09	1.75	1.60	1.55	1.75	1.90	1.88	1.78	1.74	1.92	1.76
Freq	5.1	7.2	7.5	4.6	2.8	3.7	9.1	17.2	18.4	12.4	7.1	4.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.9	4.9	3.9	3.4	4.4	5.9	6.5	6.4	5.7	4.7	4.1	5.5
	1.83	1.89	1.74	1.36	1.45	1.39	1.60	1.72	1.65	1.56	1.54	1.65	1.55
25	5.2	5.9	5.9	4.8	4.1	5.4	7.0	7.7	7.6	6.8	5.7	4.9	6.5
	1.97	2.04	1.88	1.46	1.56	1.49	1.69	1.80	1.72	1.66	1.66	1.78	1.64
50	6.0	6.8	6.8	5.6	4.8	6.3	8.0	8.8	8.6	7.8	6.6	5.7	7.5
	2.22	2.30	2.12	1.64	1.76	1.68	1.84	1.93	1.85	1.82	1.86	2.00	1.78
100	7.1	8.1	8.1	6.6	5.7	7.5	9.4	10.1	9.9	9.2	7.9	6.8	8.8
	2.36	2.44	2.25	1.74	1.87	1.78	1.98	2.08	1.98	1.95	1.98	2.13	1.92
200	8.8	10.1	10.1	8.2	7.1	9.3	11.3	12.0	11.7	11.1	9.8	8.5	10.6
	2.25	2.33	2.15	1.67	1.79	1.71	1.90	2.01	1.92	1.87	1.89	2.03	1.88
Freq	5.4	7.9	7.1	3.6	2.8	4.1	11.0	19.3	17.3	10.7	6.1	4.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.8	4.3	4.3	3.3	2.9	3.9	5.1	5.7	5.6	4.9	4.0	3.6	4.8
	1.85	1.90	1.74	1.36	1.49	1.40	1.60	1.73	1.65	1.55	1.52	1.74	1.56
25	4.7	5.3	5.3	4.1	3.7	4.9	6.3	7.0	6.8	6.0	5.0	4.5	5.9
	1.98	2.03	1.86	1.45	1.60	1.49	1.68	1.81	1.72	1.64	1.63	1.87	1.64
50	5.5	6.3	6.2	4.8	4.3	5.8	7.4	8.1	7.9	7.0	5.9	5.3	6.9
	2.19	2.25	2.06	1.60	1.76	1.65	1.81	1.92	1.82	1.79	1.80	2.06	1.76
100	6.6	7.5	7.4	5.8	5.2	6.9	8.6	9.4	9.2	8.3	7.0	6.3	8.1
	2.41	2.47	2.26	1.75	1.94	1.81	1.99	2.11	1.99	1.97	1.98	2.27	1.94
200	8.1	9.2	9.1	7.1	6.3	8.5	10.4	11.1	10.8	10.1	8.7	7.8	9.7
	2.31	2.37	2.16	1.68	1.85	1.74	1.91	2.04	1.93	1.89	1.89	2.17	1.89
Freq	5.6	8.2	6.9	3.3	2.7	4.3	11.7	20.0	17.0	10.1	5.8	4.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	3.5	3.4	2.5	2.4	3.2	4.1	4.6	4.4	3.7	3.1	2.8	3.8
	1.88	1.95	1.73	1.58	1.70	1.49	1.63	1.77	1.63	1.54	1.60	1.89	1.58
25	4.0	4.6	4.5	3.3	3.2	4.2	5.4	5.9	5.7	4.9	4.1	3.7	5.0
	1.99	2.06	1.83	1.67	1.80	1.58	1.70	1.83	1.69	1.62	1.70	2.00	1.65
50	4.8	5.5	5.4	4.1	3.8	5.1	6.4	7.1	6.8	5.9	4.9	4.5	6.0
	2.16	2.24	1.99	1.81	1.95	1.71	1.81	1.93	1.78	1.75	1.84	2.17	1.75
100	5.8	6.7	6.5	4.9	4.6	6.2	7.7	8.4	8.1	7.1	5.9	5.4	7.1
	2.47	2.56	2.26	2.06	2.22	1.95	2.01	2.10	1.94	1.99	2.10	2.47	1.94
200	7.1	8.1	8.0	6.0	5.7	7.6	9.2	10.0	9.5	8.6	7.3	6.6	8.6
	2.38	2.46	2.18	1.99	2.14	1.88	1.98	2.10	1.93	1.92	2.02	2.38	1.93
Freq	5.7	8.4	6.6	3.0	2.7	4.8	12.7	20.6	16.4	9.2	5.4	4.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.0	454	4.9	188	4.3	124	3.4	59
25	7.6	576	5.8	293	5.3	213	4.4	126
50	8.2	687	6.7	395	6.1	306	5.3	202
100	8.8	879	7.8	577	7.2	446	6.3	307
200	9.6	1196	9.4	1048	8.6	801	7.6	535

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.6	7.9	7.6	6.8	6.4	6.9	8.1	9.4	9.6	8.8	7.9	7.4	8.2
	2.28	2.29	2.16	2.17	2.19	1.85	1.88	2.14	2.12	1.92	1.88	2.03	1.97
25	8.3	8.6	8.3	7.5	7.0	7.6	8.9	10.2	10.4	9.6	8.7	8.1	8.9
	2.35	2.36	2.23	2.24	2.26	1.91	1.94	2.19	2.16	1.97	1.94	2.10	2.03
50	8.9	9.3	8.9	8.1	7.5	8.2	9.6	10.9	11.1	10.3	9.4	8.7	9.6
	2.41	2.42	2.29	2.30	2.32	1.96	1.99	2.25	2.22	2.02	1.99	2.15	2.08
100	9.6	10.1	9.7	8.7	8.2	8.9	10.3	11.8	12.0	11.1	10.1	9.4	10.3
	2.34	2.35	2.22	2.23	2.25	1.90	1.93	2.20	2.17	1.98	1.93	2.08	2.03
200	10.7	11.1	10.7	9.7	9.0	9.8	11.3	12.8	13.0	12.1	11.1	10.4	11.3
	2.21	2.22	2.10	2.11	2.13	1.79	1.84	2.11	2.09	1.90	1.83	1.98	1.95
Freq	7.5	8.5	7.5	5.6	4.7	5.4	7.6	11.6	13.6	12.1	9.0	6.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.6	5.2	4.6	4.5	4.9	5.8	6.7	6.7	6.0	5.4	5.1	5.7
	1.95	1.94	1.80	1.85	1.80	1.56	1.67	1.90	1.83	1.65	1.61	1.74	1.71
25	6.4	6.7	6.2	5.6	5.3	5.9	7.0	7.9	7.9	7.1	6.5	6.1	6.8
	2.11	2.10	1.95	2.00	1.95	1.69	1.78	2.01	1.92	1.74	1.74	1.88	1.83
50	7.4	7.7	7.2	6.4	6.2	6.9	8.1	9.1	9.0	8.2	7.5	7.0	7.8
	2.37	2.36	2.19	2.24	2.19	1.89	1.97	2.18	2.07	1.90	1.95	2.12	2.01
100	8.8	9.1	8.5	7.6	7.4	8.2	9.5	10.5	10.4	9.5	8.9	8.4	9.2
	2.53	2.51	2.33	2.39	2.33	2.02	2.11	2.34	2.23	2.04	2.08	2.25	2.16
200	10.9	11.4	10.6	9.5	9.1	10.2	11.5	12.6	12.4	11.5	11.1	10.4	11.3
	2.41	2.40	2.22	2.28	2.22	1.92	2.02	2.25	2.15	1.96	1.99	2.15	2.10
Freq	7.9	8.6	7.0	5.1	4.7	5.7	8.4	12.8	13.5	11.6	8.2	6.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.9	4.5	4.0	3.9	4.3	5.2	5.9	5.8	5.1	4.6	4.4	5.0
	1.97	1.96	1.84	1.92	1.80	1.56	1.70	1.93	1.83	1.62	1.63	1.76	1.72
25	5.8	6.0	5.5	4.9	4.8	5.4	6.4	7.2	7.1	6.3	5.8	5.4	6.1
	2.11	2.09	1.97	2.05	1.93	1.67	1.80	2.02	1.91	1.70	1.75	1.88	1.82
50	6.8	7.0	6.5	5.8	5.6	6.4	7.4	8.3	8.2	7.3	6.8	6.4	7.1
	2.34	2.31	2.18	2.27	2.13	1.84	1.96	2.17	2.04	1.84	1.94	2.08	1.98
100	8.1	8.4	7.7	6.9	6.7	7.6	8.8	9.7	9.6	8.6	8.1	7.6	8.4
	2.57	2.55	2.40	2.50	2.35	2.02	2.15	2.38	2.23	2.02	2.13	2.29	2.17
200	9.9	10.3	9.6	8.5	8.3	9.4	10.6	11.6	11.4	10.4	10.0	9.4	10.3
	2.46	2.44	2.30	2.39	2.24	1.94	2.07	2.30	2.16	1.94	2.03	2.19	2.12
Freq	8.1	8.6	6.8	5.0	4.7	5.8	8.6	13.2	13.5	11.4	7.9	6.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.8	3.5	3.1	3.0	3.5	4.1	4.7	4.6	4.0	3.6	3.4	3.9
	1.98	1.96	1.84	1.83	1.73	1.60	1.74	1.95	1.81	1.61	1.66	1.77	1.72
25	4.9	5.1	4.6	4.1	4.0	4.6	5.4	6.1	5.9	5.2	4.8	4.5	5.1
	2.10	2.08	1.95	1.94	1.83	1.69	1.82	2.03	1.88	1.68	1.76	1.87	1.81
50	5.9	6.1	5.5	4.9	4.8	5.6	6.5	7.3	7.1	6.3	5.8	5.5	6.2
	2.28	2.26	2.12	2.11	1.99	1.83	1.95	2.15	1.98	1.79	1.91	2.04	1.94
100	7.1	7.4	6.7	5.9	5.8	6.8	7.8	8.6	8.4	7.5	7.0	6.6	7.4
	2.60	2.57	2.41	2.40	2.26	2.09	2.19	2.37	2.17	2.01	2.17	2.32	2.17
200	8.6	9.0	8.2	7.3	7.1	8.3	9.4	10.3	10.0	9.1	8.5	8.1	9.0
	2.50	2.47	2.32	2.31	2.18	2.01	2.13	2.35	2.16	1.96	2.09	2.23	2.13
Freq	8.3	8.6	6.6	4.8	4.7	6.0	8.9	13.7	13.4	11.0	7.5	6.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	449	5.1	182	4.4	119	3.5	58
25	7.9	572	6.0	285	5.4	207	4.6	123
50	8.5	687	6.9	390	6.3	300	5.5	199
100	9.2	884	8.2	589	7.5	452	6.6	307
200	10.1	1220	10.0	1106	9.1	831	7.9	548

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	9.8	7.5	4.8	6.7	7.9	7.8	6.7	5.0	5.5	7.0	8.3	9.4	7.9
	2.03	1.41	1.40	1.66	1.89	1.92	1.78	1.87	1.49	1.75	2.11	2.15	1.81
25	10.7	8.2	5.3	7.3	8.6	8.6	7.4	5.5	6.0	7.7	9.1	10.2	8.7
	2.07	1.43	1.44	1.71	1.95	1.99	1.83	1.93	1.54	1.81	2.17	2.20	1.85
50	11.4	8.8	5.8	7.8	9.3	9.2	7.9	5.9	6.5	8.3	9.8	10.9	9.3
	2.12	1.47	1.48	1.75	2.00	2.04	1.88	1.98	1.58	1.86	2.23	2.26	1.90
100	12.3	9.4	6.2	8.5	10.0	10.0	8.6	6.4	7.0	9.0	10.6	11.8	10.1
	2.08	1.44	1.43	1.70	1.94	1.98	1.82	1.92	1.53	1.80	2.16	2.21	1.86
200	13.3	10.1	6.8	9.4	11.1	11.0	9.5	7.0	7.7	9.9	11.7	12.8	11.0
	2.02	1.40	1.36	1.61	1.84	1.87	1.73	1.81	1.46	1.70	2.05	2.12	1.79
Freq	11.6	4.3	2.4	4.5	9.0	10.6	6.4	3.5	4.3	8.6	16.3	18.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.8	4.3	3.4	4.8	5.6	5.3	4.2	3.4	3.9	5.0	5.9	6.8	5.5
	1.72	1.10	1.19	1.46	1.63	1.62	1.40	1.58	1.27	1.52	1.85	1.91	1.58
25	8.1	5.2	4.1	5.8	6.7	6.4	5.0	4.1	4.7	6.0	7.1	8.1	6.6
	1.79	1.14	1.27	1.58	1.76	1.74	1.51	1.71	1.37	1.64	2.00	2.01	1.68
50	9.1	5.9	4.8	6.8	7.7	7.4	5.9	4.8	5.6	7.0	8.2	9.2	7.6
	1.90	1.22	1.43	1.77	1.96	1.96	1.70	1.92	1.53	1.85	2.24	2.17	1.84
100	10.5	6.9	5.8	8.0	9.2	8.8	7.0	5.7	6.6	8.3	9.8	10.6	9.0
	2.05	1.30	1.52	1.88	2.09	2.09	1.81	2.04	1.63	1.96	2.39	2.33	1.97
200	12.2	8.1	7.1	10.0	11.3	11.0	8.7	7.1	8.2	10.3	12.1	12.6	11.0
	1.98	1.26	1.45	1.80	2.00	1.99	1.73	1.95	1.56	1.88	2.28	2.24	1.91
Freq	9.1	3.2	2.5	5.3	10.3	10.3	4.9	3.3	4.8	10.1	18.4	17.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.9	3.3	3.0	4.2	4.9	4.6	3.5	2.9	3.5	4.4	5.2	6.0	4.8
	1.67	1.02	1.21	1.46	1.67	1.64	1.44	1.51	1.31	1.56	1.86	1.93	1.59
25	7.2	4.1	3.8	5.2	6.0	5.7	4.4	3.6	4.3	5.5	6.4	7.4	5.9
	1.74	1.06	1.29	1.56	1.79	1.76	1.54	1.61	1.40	1.67	1.99	2.02	1.68
50	8.3	4.8	4.5	6.2	7.1	6.7	5.2	4.3	5.2	6.4	7.5	8.5	7.0
	1.83	1.13	1.42	1.73	1.98	1.94	1.70	1.78	1.55	1.85	2.20	2.15	1.82
100	9.6	5.8	5.4	7.4	8.5	8.0	6.2	5.1	6.2	7.7	8.9	9.9	8.3
	1.99	1.23	1.56	1.90	2.18	2.13	1.87	1.96	1.70	2.03	2.42	2.36	1.99
200	11.2	6.8	6.6	9.1	10.5	9.9	7.6	6.3	7.6	9.5	11.0	11.7	10.0
	1.94	1.19	1.49	1.81	2.08	2.04	1.79	1.87	1.63	1.94	2.31	2.28	1.94
Freq	8.3	2.8	2.5	5.6	10.7	10.1	4.4	3.3	4.9	10.7	19.2	17.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.5	2.2	2.4	3.4	3.9	3.6	2.6	2.4	2.7	3.5	4.1	4.9	3.8
	1.58	1.01	1.27	1.51	1.69	1.66	1.59	1.65	1.28	1.61	1.91	1.98	1.61
25	5.9	3.0	3.2	4.5	5.1	4.8	3.4	3.1	3.7	4.7	5.4	6.3	5.0
	1.63	1.06	1.35	1.60	1.78	1.76	1.68	1.75	1.36	1.70	2.02	2.05	1.68
50	7.0	3.7	3.9	5.4	6.2	5.8	4.1	3.8	4.5	5.6	6.6	7.6	6.0
	1.69	1.15	1.46	1.74	1.93	1.91	1.83	1.90	1.47	1.85	2.19	2.16	1.80
100	8.3	4.6	4.8	6.6	7.5	7.0	5.0	4.6	5.5	6.8	7.9	8.9	7.3
	1.82	1.30	1.66	1.98	2.19	2.17	2.08	2.16	1.67	2.10	2.50	2.36	2.00
200	9.7	5.6	5.9	8.0	9.1	8.5	6.1	5.6	6.6	8.3	9.7	10.6	8.8
	1.83	1.26	1.60	1.90	2.12	2.09	2.01	2.08	1.61	2.03	2.41	2.35	1.97
Freq	7.1	2.3	2.7	6.0	11.2	9.8	3.8	3.3	5.3	11.4	19.9	17.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.1	458	5.0	189	4.3	123	3.4	59
25	7.7	583	5.9	293	5.3	213	4.5	127
50	8.3	699	6.8	399	6.2	306	5.4	203
100	8.9	902	8.0	601	7.3	459	6.4	312
200	9.8	1248	9.7	1129	8.9	849	7.8	559

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.1	4.4	5.4	5.9	5.3	4.8	5.3	7.3	7.8	7.4	6.3	6.5
	1.72	2.15	1.66	1.44	1.54	1.56	1.73	1.56	1.59	1.67	1.73	1.91	1.56
25	5.2	4.4	4.9	5.9	6.4	5.9	5.3	5.8	8.0	8.5	8.1	6.8	7.1
	1.77	2.21	1.71	1.49	1.59	1.60	1.78	1.60	1.63	1.71	1.78	1.97	1.60
50	5.6	4.8	5.2	6.3	6.9	6.3	5.7	6.2	8.6	9.1	8.7	7.4	7.7
	1.82	2.27	1.75	1.53	1.63	1.65	1.82	1.65	1.68	1.75	1.83	2.02	1.64
100	6.0	5.2	5.7	6.8	7.5	6.8	6.2	6.7	9.3	9.8	9.4	8.0	8.3
	1.76	2.20	1.70	1.48	1.58	1.60	1.77	1.60	1.63	1.71	1.77	1.96	1.60
200	6.6	5.7	6.2	7.5	8.2	7.5	6.8	7.4	10.1	10.7	10.4	8.8	9.1
	1.67	2.08	1.61	1.40	1.50	1.51	1.67	1.51	1.56	1.64	1.68	1.86	1.53
Freq	4.5	3.2	3.5	5.4	6.1	4.7	3.5	4.3	12.1	23.0	20.1	9.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.0	2.8	3.2	3.8	4.0	3.5	3.3	3.7	5.2	5.4	4.9	4.1	4.5
	1.45	1.84	1.38	1.25	1.32	1.36	1.45	1.29	1.41	1.47	1.50	1.53	1.36
25	3.6	3.4	3.8	4.6	4.8	4.3	4.0	4.5	6.3	6.5	5.9	4.9	5.4
	1.56	1.99	1.49	1.34	1.42	1.46	1.56	1.39	1.50	1.56	1.62	1.65	1.44
50	4.3	4.0	4.5	5.4	5.7	5.0	4.7	5.2	7.3	7.5	6.9	5.7	6.3
	1.76	2.24	1.67	1.50	1.59	1.64	1.75	1.56	1.64	1.71	1.81	1.85	1.59
100	5.1	4.7	5.3	6.5	6.8	6.0	5.6	6.3	8.5	8.8	8.2	6.8	7.5
	1.87	2.38	1.77	1.60	1.69	1.74	1.86	1.66	1.76	1.83	1.93	1.97	1.69
200	6.3	5.8	6.6	8.1	8.4	7.4	7.0	7.7	10.3	10.6	10.1	8.4	9.1
	1.79	2.27	1.69	1.52	1.62	1.67	1.78	1.58	1.69	1.76	1.84	1.88	1.64
Freq	4.0	3.0	3.8	6.1	5.9	4.2	3.3	4.7	15.1	25.4	17.1	7.4	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.6	2.5	2.8	3.4	3.5	3.0	2.9	3.3	4.6	4.7	4.2	3.5	3.9
	1.58	1.86	1.35	1.30	1.36	1.37	1.44	1.30	1.44	1.48	1.52	1.56	1.37
25	3.3	3.1	3.5	4.3	4.4	3.8	3.6	4.1	5.7	5.8	5.2	4.3	4.9
	1.69	1.99	1.44	1.38	1.45	1.47	1.54	1.38	1.51	1.56	1.63	1.67	1.45
50	3.8	3.6	4.1	5.1	5.3	4.5	4.3	4.8	6.7	6.8	6.1	5.1	5.8
	1.86	2.20	1.59	1.53	1.60	1.62	1.70	1.53	1.64	1.69	1.80	1.84	1.57
100	4.6	4.3	4.9	6.2	6.3	5.4	5.1	5.8	7.9	8.1	7.3	6.1	6.9
	2.05	2.42	1.74	1.68	1.75	1.77	1.87	1.68	1.80	1.85	1.98	2.02	1.72
200	5.7	5.3	6.1	7.6	7.8	6.6	6.3	7.1	9.5	9.7	9.0	7.6	8.4
	1.96	2.31	1.67	1.61	1.68	1.70	1.79	1.61	1.73	1.78	1.89	1.94	1.67
Freq	3.8	3.0	3.8	6.3	5.8	4.0	3.3	4.9	16.2	26.2	16.0	6.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	2.0	2.3	2.7	2.8	2.4	2.3	2.6	3.7	3.8	3.2	2.6	3.1
	1.68	1.83	1.40	1.27	1.34	1.48	1.51	1.35	1.45	1.51	1.62	1.58	1.39
25	2.6	2.6	3.0	3.6	3.7	3.2	3.0	3.5	4.8	5.0	4.2	3.5	4.1
	1.77	1.94	1.48	1.34	1.42	1.56	1.60	1.43	1.52	1.58	1.72	1.68	1.46
50	3.2	3.1	3.7	4.4	4.5	3.8	3.7	4.2	5.8	6.0	5.1	4.2	5.0
	1.93	2.11	1.61	1.45	1.54	1.70	1.74	1.55	1.62	1.69	1.86	1.82	1.55
100	3.8	3.8	4.5	5.4	5.5	4.7	4.5	5.2	7.0	7.2	6.2	5.1	6.0
	2.20	2.40	1.83	1.65	1.75	1.93	1.98	1.76	1.81	1.89	2.12	2.07	1.74
200	4.7	4.6	5.5	6.6	6.7	5.7	5.5	6.3	8.4	8.6	7.6	6.2	7.3
	2.12	2.31	1.76	1.59	1.69	1.86	1.91	1.70	1.77	1.85	2.05	2.00	1.70
Freq	3.6	3.0	4.0	6.5	5.7	3.8	3.4	5.4	17.7	26.7	14.5	5.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.9	317	4.1	135	3.6	89	2.8	43
25	6.4	399	4.9	208	4.4	152	3.7	90
50	6.9	477	5.6	276	5.2	215	4.5	142
100	7.4	624	6.7	416	6.1	318	5.4	213
200	8.2	883	8.2	805	7.5	603	6.5	389

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.6	7.7	7.3	6.6	6.3	7.5	8.7	9.6	9.8	9.4	8.4	7.6	8.5
	2.38	2.40	2.24	2.12	2.09	1.99	1.90	1.98	1.97	1.91	1.92	2.20	1.91
25	8.4	8.4	8.0	7.3	6.9	8.2	9.5	10.5	10.7	10.2	9.2	8.3	9.3
	2.46	2.47	2.31	2.19	2.16	2.05	1.94	2.01	2.00	1.94	1.97	2.27	1.96
50	9.0	9.0	8.6	7.8	7.4	8.8	10.2	11.2	11.4	10.9	9.8	8.9	10.0
	2.53	2.54	2.37	2.24	2.22	2.10	1.99	2.07	2.05	2.00	2.02	2.33	2.01
100	9.7	9.8	9.4	8.4	8.0	9.5	11.0	12.0	12.2	11.7	10.6	9.6	10.7
	2.45	2.46	2.30	2.17	2.15	2.04	1.95	2.03	2.02	1.96	1.97	2.26	1.97
200	10.8	10.8	10.4	9.3	8.9	10.5	11.9	13.0	13.2	12.7	11.6	10.7	11.7
	2.31	2.33	2.17	2.06	2.03	1.93	1.87	1.96	1.96	1.90	1.88	2.13	1.91
Freq	6.8	7.1	5.4	4.0	3.9	5.3	9.7	14.7	15.6	12.3	8.7	6.4	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.3	5.0	4.5	4.4	5.4	6.2	6.9	6.9	6.5	5.7	5.2	6.0
	2.04	1.97	1.83	1.83	1.72	1.69	1.64	1.78	1.75	1.67	1.70	1.83	1.68
25	6.5	6.3	6.0	5.4	5.3	6.5	7.4	8.1	8.2	7.7	6.8	6.2	7.1
	2.20	2.13	1.98	1.98	1.86	1.83	1.73	1.86	1.83	1.75	1.83	1.97	1.77
50	7.5	7.3	7.0	6.3	6.1	7.5	8.4	9.2	9.3	8.7	7.9	7.2	8.1
	2.47	2.39	2.22	2.22	2.09	2.06	1.87	1.98	1.94	1.88	2.05	2.22	1.92
100	8.9	8.7	8.3	7.4	7.3	8.9	9.7	10.6	10.6	10.0	9.4	8.5	9.5
	2.63	2.55	2.37	2.37	2.22	2.19	2.00	2.13	2.08	2.02	2.19	2.36	2.08
200	11.0	10.8	10.3	9.2	9.0	11.1	11.6	12.4	12.4	11.9	11.6	10.6	11.4
	2.52	2.43	2.26	2.26	2.12	2.09	1.93	2.06	2.02	1.95	2.09	2.25	2.04
Freq	7.3	6.8	4.8	3.8	4.1	5.8	11.1	15.8	15.1	11.3	8.0	6.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.6	4.4	3.9	3.8	4.8	5.5	6.1	6.0	5.6	4.8	4.5	5.2
	2.04	1.94	1.81	1.81	1.72	1.71	1.67	1.80	1.74	1.68	1.71	1.88	1.68
25	5.8	5.7	5.4	4.8	4.8	5.9	6.7	7.4	7.3	6.9	6.0	5.6	6.4
	2.19	2.08	1.94	1.94	1.84	1.83	1.75	1.87	1.81	1.75	1.83	2.02	1.77
50	6.8	6.7	6.3	5.6	5.6	6.9	7.8	8.5	8.4	7.9	7.1	6.6	7.4
	2.42	2.30	2.15	2.15	2.04	2.02	1.87	1.98	1.90	1.86	2.02	2.23	1.90
100	8.1	7.9	7.6	6.7	6.7	8.3	9.1	9.8	9.8	9.2	8.4	7.8	8.7
	2.66	2.53	2.36	2.36	2.24	2.22	2.06	2.16	2.08	2.03	2.22	2.45	2.09
200	10.0	9.8	9.3	8.3	8.2	10.2	10.8	11.5	11.4	10.9	10.4	9.6	10.5
	2.54	2.42	2.26	2.26	2.14	2.13	1.99	2.10	2.02	1.97	2.13	2.35	2.05
Freq	7.4	6.8	4.6	3.7	4.1	6.0	11.7	16.1	15.0	11.0	7.7	5.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.6	3.4	3.0	3.0	3.8	4.3	4.8	4.8	4.3	3.7	3.5	4.1
	2.03	1.98	1.75	1.91	1.76	1.71	1.68	1.83	1.77	1.66	1.78	1.92	1.69
25	4.9	4.8	4.5	3.9	4.0	5.0	5.7	6.2	6.2	5.7	4.9	4.7	5.4
	2.16	2.10	1.86	2.03	1.87	1.81	1.75	1.89	1.83	1.72	1.89	2.04	1.77
50	5.9	5.8	5.4	4.7	4.8	6.1	6.8	7.4	7.4	6.8	6.0	5.6	6.4
	2.34	2.28	2.02	2.20	2.03	1.96	1.85	1.98	1.92	1.81	2.05	2.21	1.87
100	7.1	6.9	6.5	5.7	5.8	7.3	8.1	8.8	8.7	8.0	7.2	6.8	7.7
	2.67	2.60	2.30	2.51	2.31	2.23	2.03	2.14	2.07	1.98	2.34	2.52	2.07
200	8.7	8.5	8.0	7.0	7.1	8.9	9.6	10.3	10.2	9.5	8.8	8.3	9.2
	2.57	2.50	2.22	2.42	2.22	2.15	2.01	2.15	2.08	1.97	2.25	2.43	2.07
Freq	7.6	6.6	4.4	3.7	4.2	6.4	12.3	16.5	14.7	10.5	7.3	5.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.6	529	5.3	216	4.7	143	3.7	68
25	8.3	673	6.3	337	5.7	247	4.8	145
50	8.8	804	7.2	459	6.6	356	5.7	234
100	9.5	1021	8.4	668	7.7	519	6.8	357
200	10.4	1377	10.1	1192	9.3	916	8.2	613

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.8	6.2	7.0	6.6	6.3	6.4	8.0	9.4	10.0	9.8	8.8	7.1	8.3
	1.67	1.81	1.76	1.73	1.88	1.76	1.96	2.10	2.14	2.15	2.07	1.75	1.87
25	6.3	6.8	7.7	7.3	6.9	7.1	8.7	10.2	10.9	10.6	9.6	7.8	9.1
	1.73	1.87	1.82	1.78	1.94	1.82	2.03	2.14	2.18	2.19	2.13	1.80	1.91
50	6.8	7.3	8.3	7.8	7.4	7.6	9.4	10.9	11.6	11.4	10.3	8.4	9.7
	1.77	1.92	1.87	1.83	1.99	1.87	2.08	2.20	2.24	2.26	2.19	1.85	1.96
100	7.4	7.9	8.9	8.5	8.0	8.2	10.2	11.8	12.5	12.2	11.1	9.1	10.5
	1.71	1.86	1.81	1.77	1.92	1.81	2.01	2.15	2.20	2.21	2.13	1.79	1.92
200	8.1	8.7	9.9	9.3	8.9	9.1	11.2	12.8	13.5	13.3	12.2	10.0	11.5
	1.62	1.76	1.71	1.68	1.82	1.71	1.90	2.07	2.13	2.13	2.03	1.70	1.86
Freq	4.2	4.4	5.5	6.0	5.5	5.8	8.3	13.9	16.6	14.2	9.9	5.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.4	4.9	4.4	4.4	4.5	5.8	6.7	7.2	6.7	5.9	4.5	5.8
	1.41	1.59	1.45	1.51	1.56	1.47	1.74	1.84	1.92	1.88	1.70	1.41	1.63
25	4.8	5.3	5.9	5.3	5.3	5.4	7.0	8.0	8.5	8.0	7.0	5.4	6.9
	1.52	1.71	1.56	1.63	1.68	1.59	1.87	1.93	2.01	1.98	1.82	1.52	1.73
50	5.6	6.2	6.9	6.2	6.2	6.3	8.1	9.1	9.6	9.1	8.1	6.4	7.9
	1.71	1.92	1.75	1.83	1.89	1.78	2.09	2.08	2.15	2.14	2.01	1.71	1.88
100	6.7	7.3	8.3	7.4	7.3	7.5	9.5	10.5	11.0	10.5	9.5	7.6	9.3
	1.81	2.05	1.86	1.95	2.01	1.90	2.23	2.24	2.31	2.30	2.15	1.81	2.02
200	8.3	9.1	10.3	9.2	9.1	9.3	11.8	12.4	12.9	12.5	11.7	9.4	11.2
	1.73	1.96	1.78	1.86	1.92	1.81	2.13	2.16	2.23	2.21	2.06	1.73	1.97
Freq	4.1	4.6	5.8	6.1	5.2	6.1	9.1	15.6	16.4	13.2	8.8	5.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.9	4.3	3.8	3.9	3.9	5.2	5.9	6.3	5.8	5.0	3.8	5.1
	1.38	1.60	1.45	1.52	1.54	1.46	1.77	1.84	1.93	1.88	1.67	1.38	1.63
25	4.3	4.8	5.4	4.7	4.8	4.8	6.4	7.2	7.7	7.1	6.2	4.7	6.2
	1.48	1.72	1.54	1.63	1.65	1.56	1.89	1.92	2.01	1.97	1.77	1.48	1.72
50	5.1	5.7	6.4	5.6	5.7	5.7	7.5	8.4	8.8	8.3	7.3	5.6	7.3
	1.63	1.90	1.71	1.80	1.82	1.72	2.08	2.05	2.12	2.11	1.94	1.63	1.85
100	6.1	6.8	7.6	6.7	6.8	6.8	8.8	9.7	10.2	9.6	8.6	6.7	8.5
	1.79	2.08	1.88	1.98	2.00	1.89	2.28	2.24	2.32	2.31	2.13	1.79	2.02
200	7.4	8.4	9.4	8.2	8.3	8.4	10.8	11.5	12.0	11.5	10.5	8.2	10.3
	1.72	1.99	1.79	1.89	1.92	1.81	2.19	2.17	2.25	2.24	2.05	1.72	1.97
Freq	4.0	4.7	5.9	6.1	5.1	6.2	9.4	16.1	16.4	12.9	8.4	4.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.7	3.1	3.5	3.0	3.0	3.1	4.1	4.7	5.0	4.5	3.8	2.8	4.0
	1.42	1.66	1.46	1.61	1.54	1.48	1.80	1.87	1.96	1.89	1.64	1.42	1.65
25	3.6	4.1	4.6	3.9	4.0	4.1	5.4	6.2	6.5	5.9	5.1	3.8	5.2
	1.50	1.76	1.55	1.70	1.63	1.57	1.90	1.94	2.02	1.97	1.73	1.50	1.72
50	4.4	5.0	5.6	4.8	4.9	5.0	6.5	7.3	7.7	7.1	6.1	4.6	6.3
	1.63	1.91	1.68	1.85	1.77	1.71	2.05	2.04	2.12	2.09	1.87	1.63	1.83
100	5.3	6.0	6.8	5.8	5.9	6.1	7.8	8.7	9.1	8.4	7.4	5.6	7.5
	1.85	2.18	1.91	2.10	2.01	1.94	2.33	2.23	2.30	2.32	2.12	1.85	2.02
200	6.5	7.3	8.3	7.1	7.2	7.4	9.5	10.3	10.7	10.0	9.0	6.8	9.0
	1.79	2.10	1.84	2.03	1.94	1.87	2.25	2.22	2.30	2.29	2.05	1.79	2.01
Freq	4.0	4.8	6.1	5.9	5.2	6.3	9.9	16.8	16.3	12.4	7.9	4.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	501	5.2	206	4.5	136	3.6	65
25	8.0	639	6.2	322	5.5	236	4.7	140
50	8.6	764	7.1	438	6.4	341	5.6	224
100	9.3	976	8.2	644	7.6	501	6.7	342
200	10.2	1330	10.0	1173	9.1	897	8.0	597

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.7	6.1	6.3	5.8	4.9	5.3	7.2	8.9	9.8	9.4	8.0	6.6	7.8
	1.95	1.94	2.06	2.01	1.75	1.65	1.63	1.84	2.00	2.01	1.94	1.79	1.72
25	6.3	6.6	6.9	6.3	5.4	5.8	7.9	9.8	10.7	10.3	8.8	7.2	8.6
	2.01	2.00	2.12	2.07	1.81	1.70	1.68	1.88	2.03	2.06	2.00	1.85	1.75
50	6.8	7.1	7.4	6.8	5.8	6.2	8.5	10.4	11.4	11.0	9.4	7.7	9.2
	2.06	2.05	2.18	2.13	1.86	1.74	1.73	1.93	2.09	2.11	2.05	1.90	1.79
100	7.3	7.7	8.0	7.3	6.3	6.8	9.2	11.2	12.3	11.8	10.2	8.4	9.9
	2.00	1.99	2.11	2.06	1.80	1.69	1.68	1.89	2.05	2.07	1.99	1.84	1.77
200	8.1	8.5	8.9	8.1	6.9	7.4	10.1	12.1	13.2	12.9	11.3	9.2	10.8
	1.89	1.88	2.00	1.95	1.70	1.60	1.60	1.82	1.99	2.00	1.89	1.74	1.72
Freq	4.0	4.4	5.1	5.3	5.0	5.4	9.3	16.5	18.2	13.5	8.4	4.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.3	4.4	3.9	3.3	3.9	5.2	6.5	7.1	6.4	5.3	4.3	5.5
	1.69	1.60	1.77	1.65	1.44	1.44	1.42	1.65	1.83	1.74	1.58	1.48	1.52
25	4.8	5.2	5.2	4.7	4.0	4.7	6.3	7.7	8.4	7.6	6.4	5.2	6.5
	1.82	1.73	1.91	1.79	1.55	1.55	1.51	1.73	1.91	1.83	1.71	1.60	1.60
50	5.6	6.0	6.1	5.4	4.6	5.4	7.2	8.7	9.5	8.6	7.4	6.0	7.5
	2.05	1.94	2.15	2.01	1.74	1.74	1.66	1.85	2.03	1.99	1.92	1.79	1.72
100	6.6	7.1	7.2	6.4	5.5	6.5	8.5	10.0	10.8	10.0	8.8	7.2	8.7
	2.18	2.06	2.29	2.13	1.85	1.85	1.77	1.99	2.18	2.13	2.04	1.91	1.85
200	8.2	8.9	9.0	8.0	6.8	8.1	10.3	11.8	12.7	12.0	10.9	8.9	10.5
	2.08	1.97	2.19	2.04	1.77	1.77	1.71	1.92	2.11	2.06	1.95	1.82	1.82
Freq	4.1	4.5	5.3	5.3	4.9	5.7	10.6	18.5	17.4	12.2	7.3	4.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.5	3.8	3.8	3.3	2.8	3.4	4.7	5.7	6.3	5.5	4.5	3.6	4.8
	1.70	1.59	1.78	1.58	1.38	1.42	1.47	1.67	1.85	1.73	1.58	1.47	1.52
25	4.3	4.7	4.7	4.1	3.5	4.2	5.8	6.9	7.6	6.7	5.6	4.5	5.9
	1.82	1.70	1.90	1.69	1.48	1.51	1.55	1.73	1.92	1.81	1.69	1.57	1.59
50	5.1	5.5	5.5	4.8	4.1	5.0	6.8	8.0	8.8	7.8	6.6	5.3	6.8
	2.01	1.88	2.11	1.87	1.63	1.67	1.68	1.83	2.03	1.95	1.87	1.73	1.70
100	6.1	6.6	6.6	5.8	4.9	6.0	8.0	9.3	10.1	9.1	7.9	6.4	8.1
	2.21	2.06	2.32	2.05	1.79	1.84	1.85	2.01	2.21	2.14	2.05	1.90	1.86
200	7.5	8.1	8.2	7.1	6.1	7.4	9.7	10.9	11.8	10.9	9.8	7.9	9.7
	2.12	1.98	2.22	1.97	1.72	1.76	1.78	1.95	2.15	2.06	1.97	1.82	1.83
Freq	4.2	4.5	5.4	5.3	4.9	5.8	11.2	19.3	17.0	11.7	6.9	4.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.0	3.0	2.6	2.3	2.8	3.8	4.6	4.9	4.2	3.5	2.8	3.8
	1.73	1.60	1.80	1.66	1.47	1.50	1.51	1.71	1.88	1.74	1.60	1.52	1.54
25	3.6	4.0	3.9	3.4	3.0	3.7	5.0	5.9	6.4	5.5	4.6	3.7	4.9
	1.83	1.69	1.90	1.76	1.55	1.59	1.58	1.77	1.94	1.82	1.69	1.61	1.60
50	4.4	4.8	4.7	4.2	3.6	4.5	6.0	7.1	7.7	6.6	5.6	4.4	5.9
	1.99	1.83	2.07	1.91	1.69	1.72	1.69	1.85	2.03	1.94	1.83	1.75	1.69
100	5.3	5.8	5.7	5.0	4.4	5.4	7.2	8.4	9.0	7.9	6.7	5.4	7.1
	2.26	2.09	2.36	2.18	1.92	1.96	1.90	2.01	2.19	2.17	2.09	1.99	1.86
200	6.5	7.1	7.0	6.1	5.4	6.6	8.7	9.9	10.6	9.5	8.2	6.6	8.5
	2.18	2.01	2.27	2.10	1.85	1.89	1.85	2.01	2.20	2.12	2.01	1.92	1.86
Freq	4.2	4.6	5.5	5.3	4.8	6.0	11.9	19.9	16.7	10.9	6.4	3.8	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.0	471	4.9	195	4.3	130	3.4	62
25	7.6	600	5.8	304	5.3	224	4.4	132
50	8.2	715	6.7	410	6.1	320	5.3	210
100	8.8	910	7.8	593	7.2	462	6.3	318
200	9.6	1230	9.4	1057	8.6	813	7.6	547

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.7	6.2	6.5	6.2	5.7	6.3	8.6	9.9	9.9	8.8	6.7	8.0
	1.95	1.84	1.78	1.76	1.83	2.03	1.59	1.83	2.09	2.10	1.93	1.65	1.76
25	5.9	6.3	6.8	7.1	6.8	6.3	6.9	9.4	10.8	10.8	9.6	7.4	8.8
	2.01	1.90	1.83	1.82	1.89	2.10	1.64	1.87	2.13	2.14	1.98	1.70	1.80
50	6.3	6.7	7.3	7.7	7.3	6.7	7.5	10.0	11.6	11.5	10.2	7.9	9.4
	2.06	1.95	1.88	1.87	1.94	2.15	1.68	1.93	2.19	2.20	2.03	1.74	1.84
100	6.9	7.3	7.9	8.3	7.9	7.3	8.1	10.8	12.4	12.3	11.0	8.6	10.1
	2.00	1.89	1.82	1.81	1.88	2.08	1.63	1.88	2.15	2.15	1.98	1.69	1.81
200	7.6	8.0	8.7	9.1	8.7	8.0	8.9	11.7	13.4	13.4	12.0	9.5	11.1
	1.89	1.79	1.73	1.71	1.78	1.98	1.54	1.81	2.08	2.08	1.90	1.60	1.76
Freq	3.5	3.7	5.2	6.3	5.5	5.0	7.0	13.3	18.7	16.7	9.9	4.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	4.1	4.3	4.6	4.1	4.0	4.4	6.3	7.2	6.8	5.8	4.3	5.6
	1.66	1.56	1.48	1.51	1.60	1.70	1.33	1.68	1.90	1.83	1.60	1.42	1.56
25	4.4	4.9	5.2	5.5	4.9	4.8	5.4	7.5	8.5	8.1	7.0	5.2	6.7
	1.79	1.68	1.59	1.63	1.73	1.84	1.43	1.77	1.99	1.91	1.70	1.53	1.64
50	5.2	5.8	6.1	6.4	5.8	5.6	6.3	8.5	9.6	9.1	8.0	6.1	7.7
	2.01	1.89	1.79	1.83	1.94	2.06	1.60	1.91	2.12	2.05	1.86	1.72	1.78
100	6.1	6.9	7.2	7.6	6.8	6.6	7.5	9.9	11.0	10.5	9.3	7.3	9.0
	2.14	2.01	1.90	1.94	2.07	2.20	1.71	2.05	2.28	2.20	1.99	1.83	1.91
200	7.6	8.5	8.9	9.5	8.5	8.2	9.3	11.8	12.9	12.4	11.3	9.0	10.8
	2.05	1.92	1.82	1.86	1.98	2.10	1.63	1.98	2.20	2.13	1.91	1.75	1.88
Freq	3.5	3.9	5.8	6.4	5.1	5.1	7.7	15.4	19.4	15.3	8.2	4.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	3.6	3.8	4.0	3.5	3.5	3.8	5.6	6.3	5.9	5.0	3.7	4.9
	1.60	1.54	1.46	1.48	1.62	1.67	1.29	1.71	1.92	1.81	1.58	1.44	1.56
25	3.9	4.5	4.7	4.9	4.4	4.3	4.8	6.8	7.7	7.2	6.1	4.5	6.0
	1.72	1.65	1.56	1.58	1.73	1.78	1.38	1.78	1.99	1.89	1.66	1.54	1.63
50	4.6	5.3	5.5	5.8	5.2	5.1	5.7	7.9	8.9	8.3	7.2	5.4	7.0
	1.90	1.83	1.72	1.75	1.91	1.98	1.52	1.90	2.10	2.01	1.80	1.70	1.74
100	5.6	6.3	6.6	7.0	6.2	6.1	6.9	9.2	10.2	9.6	8.4	6.4	8.3
	2.08	2.01	1.89	1.92	2.10	2.17	1.67	2.08	2.30	2.20	1.98	1.87	1.90
200	6.8	7.8	8.1	8.6	7.6	7.5	8.5	10.9	12.0	11.4	10.2	7.9	9.9
	1.99	1.92	1.81	1.84	2.01	2.08	1.60	2.02	2.23	2.13	1.90	1.79	1.87
Freq	3.4	3.9	5.9	6.4	5.0	5.2	8.0	16.2	19.6	14.9	7.5	4.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.5	2.9	3.0	3.2	2.7	2.8	3.2	4.5	5.0	4.6	3.7	2.7	3.9
	1.66	1.56	1.46	1.51	1.74	1.70	1.35	1.76	1.96	1.81	1.53	1.58	1.58
25	3.3	3.8	4.0	4.2	3.6	3.7	4.2	5.8	6.6	5.9	4.9	3.6	5.1
	1.76	1.65	1.55	1.60	1.84	1.80	1.43	1.83	2.03	1.88	1.61	1.68	1.64
50	4.0	4.6	4.8	5.1	4.4	4.4	5.1	7.0	7.8	7.1	6.0	4.4	6.1
	1.91	1.79	1.68	1.74	2.00	1.95	1.55	1.93	2.12	1.98	1.73	1.82	1.73
100	4.9	5.6	5.8	6.2	5.3	5.3	6.2	8.3	9.2	8.4	7.2	5.3	7.3
	2.18	2.04	1.91	1.98	2.28	2.22	1.76	2.11	2.29	2.17	1.96	2.07	1.90
200	6.0	6.8	7.1	7.5	6.4	6.5	7.6	9.9	10.8	10.0	8.7	6.5	8.7
	2.10	1.97	1.84	1.91	2.20	2.14	1.70	2.10	2.30	2.16	1.90	2.00	1.90
Freq	3.4	4.1	6.1	6.5	4.8	5.3	8.5	17.0	19.8	14.1	6.7	3.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.2	492	5.1	204	4.4	135	3.5	65
25	7.8	626	6.0	317	5.4	233	4.5	137
50	8.4	748	6.9	429	6.3	334	5.4	220
100	9.0	950	8.0	621	7.3	484	6.5	335
200	9.8	1284	9.6	1105	8.8	854	7.8	575

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.2	4.9	4.8	3.9	3.3	3.6	4.8	8.1	8.3	6.6	3.9	6.1
	1.59	1.63	1.71	1.70	1.62	1.37	1.48	1.17	1.59	1.69	1.54	1.37	1.35
25	3.4	3.5	5.4	5.3	4.3	3.6	4.0	5.4	8.8	9.1	7.2	4.3	6.7
	1.64	1.69	1.76	1.75	1.67	1.41	1.53	1.21	1.62	1.73	1.60	1.41	1.38
50	3.6	3.8	5.8	5.7	4.6	3.9	4.3	5.8	9.4	9.7	7.8	4.6	7.2
	1.68	1.73	1.81	1.80	1.71	1.44	1.57	1.24	1.67	1.77	1.63	1.45	1.41
100	3.9	4.1	6.3	6.2	5.0	4.2	4.6	6.2	10.1	10.4	8.4	5.0	7.7
	1.63	1.68	1.75	1.74	1.65	1.40	1.52	1.20	1.63	1.74	1.58	1.40	1.39
200	4.3	4.5	6.9	6.8	5.5	4.6	5.1	6.8	10.9	11.3	9.2	5.5	8.4
	1.54	1.59	1.66	1.65	1.57	1.33	1.44	1.14	1.58	1.68	1.50	1.33	1.35
Freq	2.2	2.8	6.6	7.6	5.3	4.7	5.3	8.8	22.8	21.8	8.7	3.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.0	2.4	3.6	3.2	2.6	2.4	2.6	3.5	5.9	5.6	4.0	2.5	4.2
	1.37	1.48	1.51	1.40	1.37	1.19	1.36	1.03	1.49	1.45	1.22	1.22	1.22
25	2.5	2.9	4.3	3.8	3.1	2.9	3.1	4.3	7.1	6.6	4.8	3.1	5.1
	1.47	1.60	1.63	1.51	1.48	1.28	1.46	1.10	1.56	1.53	1.31	1.31	1.28
50	2.9	3.4	5.1	4.5	3.6	3.4	3.7	5.1	8.0	7.6	5.7	3.6	5.9
	1.65	1.79	1.83	1.70	1.65	1.44	1.64	1.22	1.67	1.66	1.46	1.47	1.37
100	3.5	4.0	6.0	5.3	4.3	4.1	4.4	6.1	9.3	8.9	6.8	4.3	6.9
	1.75	1.91	1.94	1.81	1.76	1.52	1.74	1.30	1.79	1.78	1.56	1.56	1.47
200	4.3	5.0	7.5	6.6	5.4	5.0	5.4	7.4	10.9	10.6	8.4	5.4	8.3
	1.67	1.82	1.86	1.73	1.68	1.46	1.67	1.24	1.74	1.71	1.49	1.49	1.44
Freq	2.0	3.2	8.0	7.0	4.8	4.8	5.5	10.1	27.6	17.6	6.4	3.0	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.8	2.0	3.1	2.7	2.1	2.0	2.3	3.1	5.3	4.8	3.2	2.1	3.7
	1.40	1.40	1.47	1.41	1.30	1.12	1.37	1.03	1.51	1.46	1.16	1.19	1.21
25	2.2	2.5	3.9	3.4	2.6	2.5	2.8	3.9	6.4	5.9	4.0	2.6	4.5
	1.49	1.49	1.57	1.51	1.38	1.19	1.46	1.09	1.58	1.53	1.24	1.26	1.26
50	2.6	3.0	4.6	4.0	3.1	3.0	3.3	4.6	7.4	6.9	4.8	3.1	5.3
	1.65	1.65	1.74	1.66	1.53	1.31	1.61	1.19	1.67	1.65	1.37	1.39	1.35
100	3.1	3.6	5.5	4.8	3.8	3.6	4.0	5.6	8.7	8.1	5.8	3.7	6.3
	1.81	1.81	1.91	1.83	1.68	1.44	1.76	1.30	1.83	1.81	1.49	1.52	1.46
200	3.8	4.5	6.8	5.9	4.6	4.4	4.9	6.8	10.2	9.7	7.1	4.6	7.6
	1.73	1.73	1.83	1.75	1.61	1.38	1.69	1.25	1.77	1.74	1.43	1.46	1.44
Freq	2.0	3.3	8.5	6.8	4.6	4.8	5.6	10.6	29.4	16.1	5.6	2.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.5	1.8	2.6	2.1	1.7	1.7	1.8	2.5	4.3	3.6	2.2	1.7	2.9
	1.62	1.55	1.57	1.40	1.44	1.21	1.42	1.07	1.58	1.45	1.14	1.41	1.24
25	2.0	2.3	3.4	2.8	2.3	2.3	2.4	3.4	5.6	4.8	2.9	2.2	3.9
	1.72	1.65	1.66	1.49	1.53	1.27	1.50	1.13	1.64	1.52	1.21	1.49	1.29
50	2.4	2.9	4.2	3.4	2.8	2.8	3.0	4.2	6.7	5.7	3.6	2.7	4.7
	1.86	1.79	1.81	1.61	1.66	1.38	1.62	1.21	1.72	1.63	1.30	1.62	1.36
100	2.9	3.5	5.0	4.1	3.4	3.4	3.6	5.2	7.9	6.9	4.4	3.3	5.7
	2.12	2.03	2.06	1.83	1.88	1.56	1.85	1.37	1.87	1.84	1.48	1.84	1.48
200	3.6	4.2	6.2	5.0	4.1	4.1	4.4	6.2	9.4	8.4	5.4	4.0	6.8
	2.05	1.96	1.98	1.77	1.82	1.51	1.78	1.32	1.87	1.79	1.43	1.77	1.48
Freq	2.0	3.7	8.8	6.5	4.5	4.8	5.8	11.5	31.0	14.2	4.6	2.6	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.6	338	3.9	146	3.4	96	2.7	46
25	6.1	426	4.7	224	4.2	164	3.6	97
50	6.5	505	5.4	295	4.9	231	4.3	153
100	7.0	647	6.3	421	5.7	327	5.1	226
200	7.7	888	7.6	764	6.9	587	6.1	393

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.0	6.1	7.1	7.6	7.2	6.8	7.5	9.5	10.3	10.1	9.0	7.1	8.5
	1.80	1.93	1.95	1.84	1.82	1.96	1.76	1.93	2.22	2.09	1.82	1.73	1.83
25	6.6	6.7	7.7	8.3	7.8	7.4	8.2	10.3	11.3	11.0	9.8	7.8	9.3
	1.86	1.99	2.01	1.90	1.88	2.02	1.81	1.97	2.26	2.13	1.85	1.78	1.87
50	7.1	7.2	8.3	8.9	8.4	8.0	8.9	11.0	12.0	11.8	10.5	8.4	10.0
	1.91	2.05	2.06	1.95	1.93	2.07	1.86	2.02	2.32	2.18	1.90	1.82	1.92
100	7.7	7.8	9.0	9.7	9.1	8.6	9.6	11.8	12.9	12.6	11.2	9.1	10.7
	1.85	1.98	2.00	1.89	1.87	2.01	1.80	1.98	2.28	2.15	1.87	1.77	1.89
200	8.4	8.6	9.9	10.7	10.1	9.6	10.6	12.8	14.0	13.6	12.2	10.0	11.7
	1.75	1.88	1.89	1.79	1.77	1.90	1.71	1.92	2.20	2.08	1.81	1.67	1.83
Freq	4.0	4.2	5.2	6.0	6.1	6.1	8.3	12.8	16.5	14.9	10.1	5.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.1	4.3	5.1	5.2	4.8	4.7	5.3	7.0	7.3	7.1	6.0	4.6	6.0
	1.54	1.64	1.65	1.48	1.59	1.63	1.47	1.79	2.01	1.77	1.57	1.43	1.61
25	4.9	5.2	6.1	6.2	5.8	5.7	6.3	8.3	8.7	8.3	7.1	5.6	7.1
	1.66	1.77	1.79	1.58	1.71	1.76	1.57	1.87	2.10	1.84	1.65	1.54	1.70
50	5.8	6.1	7.1	7.2	6.8	6.6	7.3	9.4	9.8	9.4	8.1	6.5	8.1
	1.86	1.99	2.01	1.77	1.92	1.98	1.73	1.99	2.24	1.96	1.79	1.73	1.83
100	6.8	7.2	8.4	8.6	8.0	7.8	8.7	10.7	11.2	10.7	9.4	7.7	9.5
	1.98	2.12	2.13	1.88	2.05	2.11	1.85	2.13	2.41	2.10	1.92	1.84	1.97
200	8.5	9.0	10.5	10.6	10.0	9.7	10.6	12.6	13.2	12.5	11.2	9.6	11.3
	1.89	2.03	2.04	1.80	1.96	2.01	1.77	2.07	2.33	2.03	1.85	1.76	1.94
Freq	3.8	4.4	5.5	6.1	6.1	6.1	9.2	14.0	17.1	13.8	8.9	5.1	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.8	4.5	4.6	4.2	4.1	4.7	6.2	6.4	6.1	5.1	3.9	5.2
	1.54	1.63	1.67	1.50	1.60	1.60	1.51	1.83	2.03	1.74	1.56	1.41	1.62
25	4.4	4.7	5.6	5.7	5.2	5.1	5.8	7.6	7.8	7.4	6.2	4.8	6.4
	1.64	1.75	1.78	1.60	1.71	1.72	1.60	1.89	2.10	1.80	1.64	1.51	1.69
50	5.2	5.6	6.6	6.7	6.1	6.0	6.8	8.7	9.0	8.6	7.3	5.7	7.4
	1.81	1.94	1.98	1.76	1.89	1.90	1.74	1.99	2.23	1.89	1.76	1.67	1.81
100	6.2	6.7	7.8	8.0	7.3	7.2	8.1	10.1	10.4	9.9	8.5	6.9	8.7
	1.99	2.13	2.17	1.93	2.08	2.08	1.91	2.17	2.44	2.06	1.94	1.83	1.98
200	7.7	8.2	9.7	9.8	9.0	8.8	9.8	11.8	12.2	11.5	10.2	8.5	10.4
	1.91	2.03	2.08	1.85	1.99	1.99	1.84	2.11	2.37	2.00	1.87	1.75	1.95
Freq	3.8	4.4	5.6	6.2	6.1	6.1	9.5	14.4	17.3	13.4	8.5	4.8	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.0	3.6	3.6	3.3	3.2	3.8	5.0	5.0	4.8	3.8	3.0	4.1
	1.55	1.69	1.71	1.51	1.67	1.63	1.55	1.87	2.07	1.70	1.58	1.46	1.64
25	3.7	4.0	4.8	4.8	4.3	4.3	5.0	6.5	6.6	6.2	5.1	3.9	5.4
	1.64	1.78	1.81	1.60	1.77	1.72	1.63	1.93	2.14	1.75	1.65	1.54	1.70
50	4.5	4.9	5.8	5.8	5.2	5.2	6.0	7.7	7.8	7.3	6.1	4.8	6.5
	1.78	1.94	1.96	1.73	1.92	1.87	1.74	2.01	2.24	1.82	1.77	1.67	1.80
100	5.4	5.9	7.0	7.0	6.3	6.3	7.3	9.1	9.2	8.6	7.3	5.8	7.7
	2.03	2.20	2.23	1.96	2.19	2.13	1.97	2.17	2.44	1.96	1.99	1.90	1.97
200	6.6	7.2	8.5	8.5	7.7	7.6	8.8	10.6	10.9	10.1	8.9	7.0	9.2
	1.95	2.13	2.15	1.89	2.11	2.05	1.91	2.18	2.44	1.97	1.94	1.83	1.98
Freq	3.7	4.6	5.7	6.3	6.0	6.2	9.9	15.1	17.5	12.9	7.8	4.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.6	558	5.4	230	4.7	152	3.7	73
25	8.3	710	6.3	357	5.7	262	4.8	155
50	8.9	847	7.2	484	6.6	377	5.7	248
100	9.5	1072	8.4	698	7.7	546	6.8	378
200	10.4	1443	10.1	1227	9.2	951	8.2	642

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.5	5.7	5.7	4.5	3.9	4.9	7.3	8.0	7.5	6.3	4.9	6.4
	1.67	1.67	1.78	1.79	1.55	1.29	0.98	1.32	1.77	2.05	1.81	1.54	1.47
25	4.4	5.0	6.3	6.3	4.9	4.3	5.4	8.0	8.8	8.2	6.9	5.4	7.0
	1.72	1.72	1.83	1.85	1.60	1.33	0.99	1.34	1.81	2.12	1.87	1.58	1.50
50	4.8	5.4	6.8	6.8	5.3	4.6	5.8	8.6	9.4	8.8	7.4	5.8	7.6
	1.76	1.76	1.88	1.90	1.64	1.37	1.00	1.37	1.87	2.17	1.92	1.63	1.54
100	5.2	5.8	7.3	7.3	5.8	5.0	6.1	9.1	10.1	9.5	8.1	6.3	8.2
	1.71	1.71	1.82	1.83	1.59	1.33	1.00	1.36	1.82	2.10	1.85	1.58	1.52
200	5.7	6.4	8.1	8.1	6.3	5.4	6.5	9.8	11.1	10.5	8.9	6.9	8.9
	1.62	1.62	1.73	1.74	1.51	1.26	0.98	1.32	1.74	1.99	1.76	1.49	1.47
Freq	3.0	4.4	7.2	6.9	4.5	4.1	6.3	13.8	21.0	16.7	8.1	3.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	3.3	4.1	3.8	2.9	2.7	3.7	5.3	5.5	5.0	4.2	3.2	4.4
	1.38	1.44	1.52	1.50	1.25	1.08	0.92	1.26	1.62	1.67	1.43	1.33	1.29
25	3.4	3.9	5.0	4.6	3.5	3.2	4.4	6.3	6.6	6.0	5.0	3.8	5.3
	1.49	1.55	1.64	1.62	1.35	1.16	0.94	1.30	1.75	1.80	1.54	1.43	1.36
50	3.9	4.6	5.8	5.3	4.1	3.8	5.0	7.2	7.7	6.9	5.8	4.5	6.2
	1.67	1.74	1.85	1.81	1.51	1.30	0.98	1.38	1.96	2.02	1.73	1.60	1.48
100	4.7	5.5	6.9	6.4	4.9	4.6	5.8	8.3	9.1	8.2	7.0	5.4	7.3
	1.77	1.85	1.96	1.93	1.60	1.38	1.04	1.48	2.08	2.15	1.84	1.71	1.60
200	5.8	6.8	8.6	7.9	6.1	5.7	6.5	9.6	11.3	10.2	8.6	6.7	8.9
	1.70	1.77	1.88	1.84	1.53	1.32	1.02	1.43	1.99	2.06	1.76	1.63	1.56
Freq	3.2	4.9	8.1	6.2	4.1	4.2	7.2	16.3	22.1	14.1	6.5	3.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.4	2.9	3.6	3.2	2.4	2.3	3.3	4.7	4.8	4.2	3.5	2.7	3.9
	1.33	1.44	1.52	1.45	1.24	1.07	0.92	1.29	1.69	1.63	1.39	1.37	1.29
25	3.0	3.6	4.5	4.0	3.0	2.9	4.0	5.8	6.0	5.2	4.4	3.4	4.8
	1.42	1.54	1.63	1.55	1.33	1.14	0.94	1.34	1.81	1.75	1.49	1.46	1.36
50	3.5	4.2	5.3	4.7	3.6	3.5	4.6	6.7	7.1	6.2	5.2	4.0	5.6
	1.56	1.70	1.80	1.71	1.46	1.26	0.97	1.41	2.00	1.94	1.64	1.62	1.46
100	4.2	5.1	6.4	5.7	4.4	4.2	5.3	7.8	8.4	7.4	6.3	4.8	6.7
	1.71	1.87	1.98	1.88	1.60	1.37	1.02	1.53	2.19	2.13	1.80	1.77	1.60
200	5.2	6.2	7.9	7.0	5.4	5.2	6.1	9.1	10.4	9.1	7.7	5.9	8.2
	1.64	1.79	1.89	1.80	1.54	1.32	1.02	1.49	2.10	2.03	1.73	1.70	1.58
Freq	3.2	5.1	8.4	5.9	3.9	4.3	7.5	17.2	22.5	13.1	5.9	3.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	1.9	2.3	2.9	2.5	1.9	1.8	2.7	3.8	3.8	3.2	2.7	2.0	3.1
	1.38	1.49	1.56	1.52	1.23	1.08	0.96	1.34	1.81	1.64	1.39	1.47	1.32
25	2.5	3.1	3.9	3.3	2.5	2.5	3.6	5.0	5.1	4.3	3.6	2.7	4.1
	1.46	1.58	1.65	1.62	1.29	1.13	0.98	1.38	1.92	1.74	1.47	1.55	1.37
50	3.1	3.8	4.7	4.0	3.0	3.0	4.3	5.9	6.1	5.2	4.4	3.2	4.9
	1.58	1.72	1.79	1.75	1.40	1.23	1.01	1.44	2.08	1.88	1.59	1.69	1.46
100	3.8	4.6	5.7	4.9	3.7	3.8	5.1	7.1	7.4	6.3	5.3	3.9	5.9
	1.80	1.95	2.04	1.99	1.59	1.39	1.05	1.56	2.37	2.15	1.81	1.92	1.60
200	4.6	5.6	7.0	5.9	4.5	4.6	5.9	8.3	9.0	7.6	6.5	4.8	7.2
	1.73	1.88	1.97	1.92	1.53	1.34	1.07	1.56	2.28	2.07	1.74	1.85	1.61
Freq	3.3	5.3	8.6	5.6	3.8	4.4	8.2	18.3	22.7	11.7	5.2	2.9	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.8	338	4.1	146	3.6	96	2.8	46
25	6.4	426	4.9	224	4.4	164	3.7	97
50	6.8	506	5.6	298	5.1	232	4.4	153
100	7.3	649	6.6	431	6.0	335	5.3	229
200	8.1	897	8.0	806	7.3	612	6.4	401

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.9	5.9	4.5	5.1	6.8	7.9	8.0	7.3	6.7	5.8	5.8	6.4	6.6
	1.84	1.58	1.35	1.48	1.66	1.84	1.85	1.83	1.83	1.74	1.81	1.79	1.74
25	7.6	6.5	4.9	5.5	7.5	8.7	8.8	7.9	7.3	6.4	6.3	7.1	7.2
	1.90	1.63	1.39	1.52	1.71	1.89	1.91	1.89	1.89	1.79	1.87	1.85	1.79
50	8.2	7.0	5.3	6.0	8.1	9.3	9.4	8.5	7.9	6.8	6.8	7.6	7.8
	1.95	1.67	1.43	1.56	1.76	1.94	1.96	1.94	1.94	1.84	1.92	1.90	1.84
100	8.9	7.5	5.7	6.4	8.7	10.1	10.2	9.3	8.5	7.4	7.4	8.2	8.4
	1.89	1.62	1.38	1.51	1.71	1.89	1.90	1.88	1.88	1.78	1.85	1.84	1.79
200	9.8	8.3	6.3	7.1	9.6	11.1	11.1	10.2	9.4	8.2	8.1	9.1	9.3
	1.79	1.53	1.31	1.44	1.62	1.80	1.81	1.78	1.78	1.69	1.76	1.74	1.70
Freq	9.2	3.0	1.4	1.2	2.9	5.6	8.0	11.9	12.7	10.5	16.0	17.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	3.7	3.0	3.6	4.8	5.6	5.5	4.8	4.5	3.9	4.0	4.6	4.5
	1.55	1.25	1.16	1.29	1.42	1.57	1.57	1.53	1.52	1.50	1.51	1.54	1.48
25	5.8	4.5	3.7	4.4	5.8	6.7	6.6	5.8	5.4	4.7	4.8	5.6	5.5
	1.67	1.35	1.25	1.40	1.53	1.68	1.69	1.65	1.64	1.62	1.63	1.66	1.59
50	6.7	5.3	4.4	5.1	6.8	7.7	7.6	6.8	6.3	5.4	5.7	6.5	6.4
	1.88	1.51	1.40	1.56	1.72	1.85	1.88	1.85	1.85	1.81	1.83	1.87	1.77
100	8.0	6.3	5.2	6.1	8.1	9.1	9.0	8.1	7.5	6.5	6.7	7.8	7.6
	2.00	1.60	1.49	1.66	1.83	1.98	2.00	1.97	1.96	1.93	1.94	1.99	1.88
200	9.9	7.8	6.5	7.6	10.0	11.1	11.1	10.0	9.4	8.1	8.3	9.6	9.4
	1.91	1.53	1.42	1.59	1.74	1.90	1.92	1.88	1.88	1.84	1.86	1.90	1.81
Freq	6.5	2.3	1.1	1.3	3.6	6.2	8.5	13.3	12.0	10.1	18.7	16.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.2	3.0	2.6	3.1	4.2	4.9	4.8	4.2	3.9	3.4	3.6	4.1	4.0
	1.54	1.20	1.17	1.27	1.43	1.59	1.58	1.54	1.53	1.53	1.59	1.54	1.50
25	5.2	3.8	3.3	3.9	5.2	6.0	5.9	5.2	4.9	4.2	4.5	5.1	4.9
	1.64	1.28	1.24	1.36	1.53	1.69	1.69	1.65	1.63	1.63	1.70	1.65	1.60
50	6.1	4.5	4.0	4.7	6.2	7.1	6.9	6.1	5.7	4.9	5.3	6.0	5.8
	1.81	1.41	1.37	1.50	1.69	1.85	1.86	1.82	1.81	1.81	1.88	1.82	1.75
100	7.3	5.5	4.8	5.6	7.4	8.4	8.3	7.3	6.9	5.9	6.3	7.2	7.0
	1.99	1.54	1.50	1.65	1.86	2.03	2.04	2.00	1.99	1.99	2.06	2.00	1.92
200	9.0	6.7	5.8	6.9	9.1	10.2	10.1	9.0	8.5	7.3	7.8	8.9	8.6
	1.91	1.48	1.44	1.58	1.77	1.95	1.96	1.92	1.90	1.90	1.98	1.92	1.85
Freq	5.6	2.1	1.1	1.4	3.8	6.5	8.7	13.8	11.8	10.0	19.7	15.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.2	2.2	2.1	2.5	3.4	3.9	3.7	3.3	3.0	2.6	2.9	3.3	3.1
	1.48	1.15	1.18	1.33	1.47	1.60	1.58	1.60	1.51	1.64	1.59	1.61	1.52
25	4.2	2.9	2.7	3.3	4.5	5.1	4.9	4.4	4.0	3.5	3.8	4.4	4.2
	1.56	1.22	1.25	1.40	1.55	1.68	1.67	1.70	1.60	1.74	1.68	1.70	1.60
50	5.1	3.6	3.4	4.1	5.5	6.1	5.9	5.3	4.9	4.2	4.6	5.4	5.1
	1.69	1.31	1.35	1.52	1.69	1.80	1.81	1.84	1.74	1.88	1.83	1.85	1.73
100	6.2	4.4	4.1	5.0	6.7	7.4	7.2	6.4	5.9	5.1	5.6	6.5	6.1
	1.92	1.49	1.53	1.73	1.92	2.04	2.06	2.10	1.98	2.15	2.08	2.10	1.96
200	7.6	5.4	5.0	6.1	8.1	8.9	8.7	7.9	7.2	6.2	6.8	7.9	7.5
	1.85	1.44	1.48	1.67	1.85	1.98	1.99	2.02	1.91	2.07	2.01	2.03	1.89
Freq	4.5	1.8	1.0	1.5	4.1	6.8	9.2	14.1	11.6	10.2	20.2	15.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.9	275	4.1	117	3.6	77	2.8	37
25	6.4	349	4.9	180	4.4	132	3.7	78
50	6.9	420	5.7	243	5.2	188	4.5	125
100	7.5	554	6.7	377	6.2	288	5.4	191
200	8.3	794	8.3	754	7.6	561	6.6	360

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	5.7	4.2	3.8	4.4	7.0	9.0	9.8	9.1	8.5	7.9	8.0	8.3
	1.82	1.48	1.66	1.62	1.09	1.33	1.68	1.90	1.96	2.06	2.06	1.96	1.85
25	8.6	6.2	4.6	4.2	4.8	7.6	9.8	10.6	9.9	9.3	8.6	8.8	9.1
	1.87	1.53	1.71	1.67	1.12	1.36	1.71	1.92	2.00	2.12	2.13	2.02	1.90
50	9.2	6.7	4.9	4.5	5.2	8.2	10.5	11.3	10.6	10.0	9.3	9.4	9.7
	1.92	1.57	1.75	1.71	1.15	1.39	1.75	1.98	2.06	2.17	2.19	2.07	1.95
100	10.0	7.3	5.3	4.8	5.6	8.7	11.2	12.1	11.4	10.8	10.1	10.2	10.5
	1.87	1.52	1.70	1.66	1.12	1.37	1.73	1.94	2.01	2.11	2.12	2.01	1.90
200	11.0	8.0	5.9	5.3	6.1	9.4	12.1	13.1	12.4	11.9	11.1	11.3	11.5
	1.78	1.44	1.61	1.57	1.06	1.33	1.68	1.89	1.94	2.01	2.01	1.90	1.83
Freq	8.0	2.5	1.5	0.9	0.8	2.1	4.6	8.5	19.4	21.0	16.2	14.6	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.2	3.6	2.7	2.7	3.1	5.0	6.5	6.9	6.2	5.7	5.4	5.6	5.7
	1.50	1.24	1.44	1.28	0.95	1.21	1.57	1.71	1.74	1.74	1.74	1.63	1.61
25	6.3	4.3	3.3	3.3	3.8	5.9	7.7	8.1	7.4	6.9	6.5	6.7	6.9
	1.61	1.33	1.56	1.38	1.01	1.26	1.63	1.78	1.84	1.87	1.87	1.76	1.71
50	7.3	5.1	3.8	3.8	4.5	6.8	8.7	9.2	8.5	8.0	7.6	7.8	7.9
	1.80	1.49	1.74	1.55	1.10	1.34	1.72	1.89	2.01	2.10	2.11	1.96	1.87
100	8.7	6.1	4.6	4.6	5.4	7.8	10.0	10.5	9.9	9.5	9.0	9.2	9.3
	1.92	1.59	1.86	1.65	1.17	1.44	1.85	2.03	2.16	2.24	2.24	2.09	2.01
200	10.7	7.6	5.7	5.7	6.5	9.1	11.6	12.2	11.9	11.8	11.2	11.4	11.3
	1.83	1.52	1.77	1.57	1.13	1.39	1.79	1.96	2.07	2.14	2.14	2.00	1.95
Freq	5.5	2.0	1.4	0.7	0.8	2.7	5.2	9.7	23.1	18.9	15.8	14.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	2.9	2.3	2.3	2.5	4.5	5.7	6.0	5.3	4.9	4.7	4.9	5.0
	1.46	1.20	1.47	1.23	0.90	1.26	1.59	1.72	1.73	1.73	1.74	1.63	1.61
25	5.5	3.7	2.9	2.9	3.2	5.5	7.0	7.3	6.6	6.1	5.9	6.0	6.2
	1.56	1.28	1.57	1.31	0.94	1.30	1.64	1.78	1.81	1.85	1.86	1.74	1.69
50	6.5	4.4	3.4	3.5	3.8	6.4	8.0	8.4	7.7	7.2	6.9	7.1	7.2
	1.72	1.41	1.73	1.45	1.00	1.38	1.73	1.88	1.96	2.05	2.06	1.91	1.83
100	7.8	5.3	4.1	4.2	4.6	7.5	9.3	9.7	9.0	8.5	8.2	8.4	8.5
	1.88	1.55	1.90	1.59	1.09	1.50	1.88	2.05	2.15	2.25	2.26	2.10	2.01
200	9.6	6.4	5.0	5.2	5.4	8.7	10.8	11.4	10.8	10.5	10.2	10.3	10.3
	1.81	1.48	1.82	1.52	1.06	1.46	1.83	1.99	2.08	2.15	2.16	2.01	1.96
Freq	4.6	1.9	1.4	0.6	0.9	2.8	5.4	10.1	24.4	18.2	15.7	14.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	2.2	1.8	1.8	2.2	3.6	4.5	4.6	4.2	3.8	3.7	3.9	3.9
	1.32	1.30	1.60	1.17	0.99	1.31	1.61	1.68	1.76	1.75	1.75	1.66	1.62
25	4.2	3.0	2.4	2.4	3.0	4.8	5.9	6.0	5.5	5.0	4.9	5.1	5.2
	1.40	1.37	1.69	1.23	1.04	1.35	1.65	1.74	1.85	1.85	1.85	1.74	1.69
50	5.1	3.6	2.9	2.9	3.7	5.7	7.0	7.1	6.6	6.1	5.9	6.2	6.2
	1.52	1.49	1.83	1.33	1.12	1.42	1.73	1.81	1.98	2.01	2.01	1.88	1.81
100	6.2	4.4	3.5	3.6	4.6	6.8	8.3	8.4	7.9	7.3	7.2	7.5	7.5
	1.73	1.69	2.09	1.51	1.26	1.53	1.85	1.96	2.21	2.29	2.29	2.13	2.01
200	7.6	5.4	4.3	4.4	5.6	8.0	9.7	9.9	9.6	8.9	8.8	9.1	9.0
	1.66	1.63	2.01	1.46	1.22	1.53	1.87	1.97	2.16	2.20	2.20	2.06	1.99
Freq	3.6	1.7	1.2	0.6	1.0	3.0	5.8	11.0	25.8	17.1	15.6	13.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.4	506	5.1	206	4.5	135	3.5	64
25	8.0	643	6.1	320	5.5	233	4.6	137
50	8.6	769	7.0	434	6.4	335	5.5	220
100	9.3	989	8.2	647	7.5	497	6.6	335
200	10.2	1358	10.0	1209	9.1	909	8.0	596

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.3	7.2	6.3	6.9	8.4	10.2	10.9	10.9	10.8	10.4	9.8	9.2	9.7
	2.02	1.86	1.88	1.69	1.73	2.06	2.32	2.41	2.45	2.40	2.27	2.19	2.12
25	9.1	7.9	6.9	7.6	9.2	11.1	11.9	11.9	11.8	11.4	10.7	10.1	10.6
	2.08	1.91	1.94	1.74	1.76	2.10	2.35	2.45	2.49	2.44	2.31	2.24	2.16
50	9.8	8.5	7.4	8.2	9.8	11.9	12.7	12.7	12.6	12.1	11.4	10.8	11.3
	2.13	1.96	1.99	1.79	1.81	2.15	2.41	2.51	2.56	2.51	2.38	2.31	2.22
100	10.6	9.2	8.0	8.9	10.5	12.7	13.6	13.6	13.4	13.0	12.3	11.6	12.2
	2.07	1.90	1.92	1.73	1.77	2.12	2.38	2.47	2.52	2.46	2.33	2.25	2.18
200	11.7	10.1	8.9	9.8	11.4	13.7	14.6	14.7	14.6	14.1	13.4	12.7	13.3
	1.97	1.80	1.82	1.64	1.71	2.06	2.31	2.39	2.44	2.37	2.24	2.15	2.12
Freq	5.9	4.4	3.8	4.2	5.2	7.2	9.9	12.2	14.2	13.5	10.9	8.5	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.8	4.2	5.0	6.1	7.5	7.8	7.8	7.6	7.3	6.8	6.4	6.9
	1.65	1.54	1.59	1.42	1.57	1.92	2.11	2.16	2.18	2.07	1.96	1.87	1.88
25	6.7	5.8	5.1	6.0	7.3	8.8	9.1	9.1	9.0	8.6	8.1	7.6	8.1
	1.77	1.67	1.72	1.52	1.65	1.99	2.19	2.25	2.28	2.17	2.06	1.99	1.97
50	7.8	6.7	5.9	7.0	8.3	10.0	10.3	10.3	10.2	9.7	9.2	8.7	9.2
	1.99	1.87	1.93	1.70	1.77	2.11	2.32	2.39	2.43	2.33	2.24	2.18	2.12
100	9.2	8.0	7.0	8.3	9.6	11.3	11.7	11.7	11.6	11.1	10.6	10.1	10.7
	2.12	1.99	2.05	1.81	1.90	2.27	2.49	2.57	2.61	2.51	2.40	2.34	2.27
200	11.4	9.9	8.7	10.3	11.3	13.2	13.7	13.7	13.7	13.2	12.7	12.3	12.7
	2.02	1.90	1.96	1.73	1.83	2.20	2.42	2.49	2.53	2.42	2.31	2.25	2.22
Freq	5.4	4.2	3.8	4.4	5.5	7.8	10.6	12.6	14.8	12.8	10.5	7.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	4.1	3.6	4.4	5.4	6.6	6.8	6.7	6.7	6.3	5.9	5.5	6.0
	1.63	1.54	1.61	1.44	1.58	1.96	2.12	2.17	2.20	2.06	1.96	1.87	1.88
25	5.9	5.1	4.5	5.5	6.6	8.0	8.2	8.2	8.1	7.7	7.2	6.8	7.3
	1.74	1.65	1.73	1.52	1.65	2.02	2.20	2.24	2.28	2.15	2.05	1.98	1.96
50	7.0	6.0	5.3	6.5	7.7	9.2	9.4	9.4	9.3	8.8	8.4	7.9	8.5
	1.93	1.83	1.90	1.67	1.75	2.12	2.31	2.37	2.42	2.30	2.20	2.15	2.09
100	8.3	7.2	6.4	7.8	8.9	10.6	10.9	10.8	10.7	10.2	9.8	9.3	9.8
	2.12	2.01	2.09	1.84	1.92	2.31	2.53	2.59	2.64	2.51	2.42	2.36	2.29
200	10.3	8.9	7.8	9.5	10.5	12.3	12.7	12.7	12.6	12.1	11.7	11.2	11.7
	2.03	1.92	2.00	1.76	1.85	2.25	2.45	2.51	2.56	2.43	2.34	2.27	2.24
Freq	5.2	4.1	3.8	4.4	5.6	8.0	10.8	12.7	15.0	12.5	10.3	7.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.2	2.8	3.6	4.3	5.3	5.3	5.3	5.2	4.9	4.6	4.3	4.7
	1.60	1.53	1.62	1.46	1.61	2.00	2.13	2.16	2.19	2.04	1.95	1.85	1.88
25	4.8	4.2	3.8	4.7	5.7	6.8	6.9	6.9	6.8	6.4	6.0	5.6	6.1
	1.70	1.62	1.72	1.53	1.67	2.06	2.19	2.23	2.27	2.12	2.03	1.94	1.95
50	5.9	5.1	4.6	5.7	6.7	8.1	8.2	8.2	8.1	7.6	7.2	6.8	7.3
	1.84	1.76	1.86	1.64	1.75	2.14	2.29	2.33	2.38	2.23	2.15	2.08	2.05
100	7.1	6.2	5.5	6.9	8.0	9.5	9.6	9.6	9.5	9.0	8.6	8.1	8.7
	2.10	2.00	2.12	1.86	1.91	2.29	2.47	2.52	2.58	2.44	2.38	2.34	2.24
200	8.7	7.6	6.7	8.4	9.5	11.1	11.3	11.3	11.2	10.6	10.2	9.7	10.3
	2.02	1.93	2.05	1.80	1.90	2.31	2.48	2.53	2.58	2.43	2.35	2.27	2.24
Freq	4.9	4.0	3.7	4.6	5.7	8.3	11.2	12.9	15.2	12.1	10.1	7.3	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.6	708	6.1	283	5.3	186	4.2	90
25	9.4	904	7.2	445	6.5	324	5.4	193
50	10.0	1078	8.2	608	7.5	469	6.5	311
100	10.8	1355	9.4	874	8.7	682	7.7	477
200	11.7	1791	11.2	1497	10.3	1161	9.1	798

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.3	5.6	4.9	5.5	7.2	8.3	7.8	6.9	6.4	6.4	6.7	6.6	6.7
	1.86	1.78	1.69	1.30	1.49	1.65	1.63	1.68	1.78	1.90	1.94	1.92	1.68
25	6.9	6.1	5.4	6.0	7.9	9.1	8.5	7.6	7.0	7.0	7.3	7.2	7.4
	1.92	1.83	1.74	1.35	1.53	1.67	1.67	1.73	1.83	1.96	2.00	1.98	1.72
50	7.4	6.6	5.8	6.5	8.5	9.7	9.1	8.2	7.5	7.6	7.9	7.8	7.9
	1.97	1.88	1.79	1.38	1.57	1.72	1.71	1.77	1.88	2.02	2.05	2.03	1.77
100	8.1	7.1	6.3	7.0	9.1	10.4	9.8	8.9	8.1	8.2	8.6	8.4	8.6
	1.91	1.82	1.73	1.34	1.53	1.69	1.67	1.72	1.82	1.95	1.99	1.97	1.73
200	8.9	7.8	6.9	7.7	9.9	11.2	10.6	9.8	9.0	9.0	9.4	9.3	9.4
	1.81	1.73	1.64	1.27	1.48	1.63	1.61	1.63	1.73	1.85	1.88	1.86	1.66
Freq	9.1	4.8	2.7	2.6	4.2	7.7	10.5	11.1	10.2	11.1	12.8	13.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	3.8	3.3	3.9	5.2	5.9	5.2	4.7	4.3	4.5	4.6	4.5	4.6
	1.54	1.51	1.36	1.13	1.34	1.46	1.40	1.46	1.54	1.62	1.63	1.58	1.44
25	5.2	4.5	4.0	4.8	6.2	7.0	6.2	5.7	5.2	5.4	5.6	5.4	5.6
	1.67	1.63	1.46	1.21	1.41	1.53	1.49	1.57	1.66	1.75	1.76	1.71	1.54
50	6.0	5.3	4.6	5.6	7.1	7.9	7.2	6.7	6.0	6.3	6.5	6.3	6.5
	1.87	1.83	1.64	1.35	1.52	1.64	1.64	1.76	1.86	1.97	1.98	1.92	1.71
100	7.2	6.3	5.5	6.7	8.3	9.2	8.4	7.9	7.2	7.5	7.7	7.5	7.7
	1.99	1.94	1.74	1.43	1.63	1.76	1.75	1.88	1.98	2.10	2.11	2.04	1.83
200	8.9	7.8	6.9	8.3	9.9	10.8	10.2	9.8	8.9	9.4	9.6	9.3	9.4
	1.90	1.86	1.67	1.37	1.58	1.70	1.68	1.79	1.89	2.00	2.01	1.95	1.78
Freq	7.4	4.1	2.3	2.9	4.6	8.8	10.9	11.1	9.9	11.8	13.1	13.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.2	2.8	3.6	4.5	5.1	4.4	4.0	3.7	4.0	4.0	4.0	4.0
	1.54	1.48	1.34	1.17	1.35	1.45	1.40	1.42	1.56	1.62	1.63	1.60	1.44
25	4.6	4.0	3.5	4.5	5.6	6.2	5.5	5.0	4.6	4.9	5.0	4.9	5.0
	1.65	1.58	1.43	1.24	1.41	1.51	1.49	1.51	1.67	1.73	1.74	1.72	1.53
50	5.4	4.7	4.2	5.3	6.5	7.2	6.5	5.9	5.4	5.8	5.9	5.8	5.9
	1.83	1.75	1.58	1.36	1.51	1.60	1.62	1.67	1.85	1.91	1.93	1.90	1.67
100	6.5	5.7	5.0	6.4	7.7	8.4	7.7	7.1	6.5	6.9	7.0	6.9	7.0
	2.01	1.92	1.73	1.49	1.65	1.74	1.78	1.84	2.03	2.10	2.12	2.08	1.84
200	8.0	7.0	6.2	7.8	9.1	9.9	9.3	8.8	8.0	8.5	8.7	8.5	8.6
	1.92	1.84	1.66	1.43	1.60	1.69	1.71	1.76	1.94	2.01	2.03	1.99	1.78
Freq	6.9	3.9	2.2	3.0	4.8	9.2	11.0	11.1	9.8	12.1	13.3	12.9	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.5	2.1	2.8	3.6	4.0	3.4	3.2	2.9	3.1	3.2	3.2	3.2
	1.54	1.53	1.30	1.16	1.37	1.48	1.43	1.46	1.58	1.63	1.64	1.63	1.46
25	3.8	3.3	2.8	3.7	4.7	5.3	4.6	4.2	3.8	4.1	4.2	4.2	4.2
	1.63	1.62	1.38	1.23	1.42	1.53	1.51	1.55	1.68	1.73	1.74	1.73	1.54
50	4.6	4.0	3.5	4.6	5.7	6.3	5.5	5.1	4.6	5.0	5.1	5.1	5.1
	1.77	1.76	1.49	1.32	1.51	1.61	1.63	1.68	1.82	1.88	1.88	1.88	1.65
100	5.6	4.9	4.3	5.6	6.8	7.5	6.7	6.2	5.6	6.1	6.1	6.1	6.2
	2.02	2.00	1.70	1.49	1.67	1.76	1.86	1.91	2.07	2.13	2.15	2.13	1.86
200	6.8	6.0	5.2	6.8	8.1	8.9	8.2	7.5	6.8	7.4	7.5	7.5	7.5
	1.94	1.93	1.63	1.44	1.65	1.75	1.79	1.84	2.00	2.06	2.07	2.06	1.82
Freq	6.2	3.6	2.1	3.1	5.1	9.8	11.1	11.1	9.7	12.4	13.4	12.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.0	307	4.2	131	3.7	86	2.9	41
25	6.6	390	5.0	202	4.5	148	3.8	86
50	7.0	467	5.8	270	5.3	210	4.6	137
100	7.6	609	6.8	407	6.3	312	5.5	208
200	8.4	857	8.4	790	7.6	592	6.7	381

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.9	4.5	4.7	5.4	5.9	5.9	6.0	6.7	7.8	8.4	8.3	7.1	6.9
	1.53	1.38	1.42	1.50	1.58	1.63	1.70	1.79	2.01	1.99	1.85	1.61	1.67
25	5.4	5.0	5.2	5.9	6.4	6.5	6.6	7.3	8.5	9.1	9.1	7.8	7.5
	1.58	1.43	1.46	1.54	1.62	1.69	1.75	1.85	2.07	2.04	1.89	1.65	1.71
50	5.8	5.4	5.6	6.4	6.9	7.0	7.1	7.9	9.2	9.8	9.7	8.4	8.1
	1.62	1.47	1.50	1.59	1.67	1.73	1.80	1.90	2.13	2.10	1.95	1.70	1.76
100	6.3	5.8	6.0	6.9	7.5	7.5	7.7	8.5	9.9	10.6	10.5	9.1	8.8
	1.56	1.42	1.45	1.54	1.62	1.68	1.74	1.83	2.06	2.04	1.90	1.65	1.71
200	6.9	6.4	6.6	7.6	8.3	8.3	8.5	9.4	11.0	11.6	11.5	9.9	9.6
	1.48	1.35	1.38	1.46	1.53	1.59	1.65	1.74	1.95	1.94	1.81	1.57	1.63
Freq	5.0	4.1	4.3	5.3	6.1	6.5	7.1	8.7	12.3	15.6	15.3	9.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.0	3.3	3.8	4.1	4.0	4.2	4.7	5.5	5.8	5.7	4.3	4.7
	1.25	1.15	1.23	1.30	1.34	1.38	1.44	1.53	1.74	1.66	1.58	1.26	1.44
25	4.0	3.7	4.0	4.7	4.9	4.8	5.1	5.7	6.6	6.9	6.8	5.2	5.7
	1.34	1.24	1.32	1.40	1.45	1.49	1.56	1.65	1.87	1.77	1.67	1.35	1.53
50	4.7	4.4	4.7	5.5	5.7	5.7	5.9	6.6	7.7	8.0	7.9	6.1	6.6
	1.50	1.39	1.48	1.57	1.62	1.67	1.74	1.85	2.11	1.96	1.83	1.52	1.69
100	5.6	5.2	5.6	6.5	6.8	6.8	7.1	7.9	9.1	9.4	9.2	7.3	7.9
	1.60	1.48	1.57	1.67	1.73	1.77	1.86	1.97	2.24	2.09	1.96	1.61	1.80
200	6.9	6.5	6.9	8.1	8.5	8.4	8.7	9.8	11.4	11.5	11.1	9.0	9.7
	1.52	1.41	1.50	1.59	1.65	1.70	1.77	1.88	2.14	2.00	1.88	1.54	1.74
Freq	4.6	4.0	4.4	5.6	6.3	6.5	7.4	9.1	13.5	16.1	14.8	7.7	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.7	2.8	3.4	3.6	3.5	3.7	4.1	4.8	5.1	5.0	3.5	4.1
	1.24	1.19	1.23	1.32	1.37	1.40	1.46	1.54	1.74	1.64	1.56	1.24	1.44
25	3.5	3.4	3.6	4.2	4.4	4.4	4.6	5.1	6.0	6.2	6.1	4.4	5.1
	1.33	1.27	1.31	1.41	1.46	1.50	1.56	1.64	1.87	1.74	1.65	1.33	1.53
50	4.2	4.1	4.2	5.0	5.3	5.2	5.4	6.1	7.1	7.3	7.2	5.2	6.0
	1.46	1.40	1.44	1.55	1.62	1.66	1.72	1.81	2.06	1.89	1.78	1.46	1.66
100	5.1	4.9	5.1	6.1	6.3	6.2	6.5	7.3	8.4	8.6	8.4	6.3	7.2
	1.60	1.53	1.58	1.71	1.77	1.82	1.89	1.99	2.27	2.08	1.96	1.60	1.81
200	6.2	6.0	6.3	7.4	7.8	7.6	8.0	8.9	10.4	10.4	10.2	7.7	8.8
	1.54	1.47	1.51	1.63	1.70	1.74	1.81	1.91	2.17	2.00	1.89	1.54	1.76
Freq	4.4	4.0	4.5	5.7	6.3	6.6	7.5	9.3	13.9	16.2	14.6	7.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.2	2.1	2.3	2.7	2.8	2.7	2.9	3.3	3.8	4.0	3.9	2.5	3.3
	1.23	1.17	1.27	1.36	1.38	1.38	1.47	1.56	1.78	1.65	1.57	1.29	1.46
25	2.9	2.8	3.1	3.6	3.7	3.6	3.9	4.4	5.1	5.3	5.1	3.4	4.3
	1.29	1.23	1.34	1.44	1.46	1.46	1.55	1.66	1.89	1.73	1.64	1.37	1.53
50	3.6	3.4	3.8	4.4	4.6	4.4	4.7	5.3	6.1	6.3	6.2	4.1	5.2
	1.40	1.33	1.45	1.56	1.58	1.58	1.69	1.80	2.05	1.85	1.75	1.48	1.64
100	4.4	4.2	4.6	5.4	5.5	5.4	5.7	6.4	7.4	7.6	7.4	5.0	6.3
	1.59	1.51	1.65	1.77	1.80	1.80	1.92	2.05	2.34	2.08	1.96	1.68	1.83
200	5.3	5.1	5.6	6.6	6.8	6.6	7.0	7.8	9.1	9.1	8.9	6.1	7.7
	1.53	1.46	1.59	1.71	1.73	1.73	1.85	1.98	2.25	2.03	1.91	1.62	1.79
Freq	4.3	4.0	4.6	5.9	6.4	6.6	7.6	9.6	14.5	16.4	14.2	6.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	6.1	333	4.3	140	3.7	93	2.9	44
25	6.7	423	5.1	218	4.6	159	3.9	94
50	7.2	507	5.9	291	5.4	226	4.7	149
100	7.8	665	7.0	446	6.4	340	5.6	226
200	8.6	942	8.6	874	7.8	650	6.8	418

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	4.7	4.4	4.9	5.6	6.1	6.5	6.5	6.1	5.4	5.2	5.1	5.6
	1.48	1.28	1.31	1.51	1.54	1.60	1.81	1.97	1.84	1.74	1.76	1.73	1.65
25	5.5	5.2	4.8	5.4	6.1	6.7	7.1	7.2	6.7	6.0	5.7	5.6	6.2
	1.53	1.32	1.35	1.56	1.58	1.64	1.87	2.03	1.90	1.79	1.82	1.78	1.70
50	5.9	5.6	5.2	5.8	6.6	7.2	7.7	7.7	7.2	6.4	6.1	6.0	6.7
	1.57	1.36	1.38	1.60	1.63	1.69	1.92	2.09	1.95	1.84	1.87	1.82	1.74
100	6.4	6.0	5.6	6.3	7.1	7.8	8.3	8.4	7.8	6.9	6.6	6.5	7.2
	1.52	1.31	1.34	1.55	1.58	1.63	1.86	2.02	1.89	1.78	1.81	1.77	1.69
200	7.0	6.6	6.1	6.9	7.8	8.6	9.2	9.2	8.6	7.7	7.3	7.2	7.9
	1.44	1.25	1.27	1.47	1.49	1.55	1.76	1.91	1.79	1.69	1.71	1.67	1.60
Freq	7.1	5.8	4.6	4.9	6.3	8.9	11.8	12.9	11.3	9.5	8.8	8.3	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.4	3.1	2.9	3.5	3.9	4.2	4.5	4.5	4.0	3.7	3.6	3.5	3.9
	1.21	1.09	1.16	1.31	1.31	1.35	1.59	1.65	1.49	1.48	1.51	1.45	1.40
25	4.1	3.8	3.5	4.3	4.7	5.1	5.5	5.4	4.9	4.5	4.3	4.3	4.7
	1.29	1.17	1.25	1.41	1.41	1.46	1.71	1.79	1.61	1.59	1.63	1.56	1.51
50	4.8	4.5	4.2	5.0	5.5	6.0	6.3	6.3	5.7	5.2	5.0	5.0	5.5
	1.45	1.30	1.40	1.58	1.58	1.63	1.92	2.01	1.81	1.79	1.83	1.76	1.69
100	5.8	5.4	5.0	6.0	6.6	7.1	7.6	7.5	6.8	6.2	6.0	6.0	6.5
	1.54	1.38	1.49	1.68	1.68	1.74	2.05	2.13	1.92	1.90	1.94	1.87	1.79
200	7.1	6.7	6.2	7.4	8.1	8.8	9.4	9.3	8.4	7.7	7.4	7.4	8.1
	1.48	1.32	1.42	1.60	1.61	1.66	1.96	2.04	1.84	1.82	1.86	1.79	1.71
Freq	6.6	5.5	4.3	5.2	6.7	9.7	12.4	12.9	10.7	9.3	8.6	8.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.8	2.7	2.6	3.1	3.4	3.7	4.0	3.9	3.5	3.2	3.0	3.0	3.4
	1.15	1.07	1.24	1.29	1.33	1.37	1.60	1.65	1.47	1.46	1.46	1.39	1.39
25	3.5	3.4	3.3	3.9	4.3	4.6	4.9	4.8	4.3	4.0	3.8	3.8	4.2
	1.23	1.14	1.33	1.38	1.42	1.46	1.72	1.76	1.57	1.56	1.56	1.49	1.48
50	4.3	4.1	3.9	4.6	5.1	5.5	5.8	5.7	5.1	4.7	4.5	4.5	5.0
	1.35	1.26	1.47	1.52	1.56	1.61	1.90	1.95	1.73	1.73	1.73	1.64	1.63
100	5.1	4.9	4.7	5.5	6.1	6.6	6.9	6.8	6.1	5.6	5.4	5.3	6.0
	1.48	1.37	1.61	1.67	1.71	1.76	2.08	2.14	1.90	1.90	1.90	1.80	1.78
200	6.3	6.1	5.8	6.8	7.5	8.1	8.5	8.4	7.5	6.9	6.6	6.6	7.3
	1.41	1.32	1.54	1.60	1.64	1.69	1.99	2.05	1.82	1.81	1.81	1.73	1.71
Freq	6.5	5.4	4.2	5.3	6.8	10.0	12.6	12.9	10.4	9.2	8.6	8.1	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.2	2.0	2.5	2.7	3.0	3.1	3.1	2.7	2.5	2.5	2.5	2.7
	1.19	1.10	1.24	1.34	1.34	1.38	1.64	1.65	1.46	1.53	1.56	1.48	1.42
25	3.1	2.9	2.6	3.3	3.6	3.9	4.2	4.1	3.6	3.4	3.3	3.3	3.6
	1.26	1.16	1.31	1.42	1.42	1.46	1.74	1.75	1.54	1.62	1.66	1.56	1.50
50	3.8	3.6	3.2	4.1	4.4	4.8	5.0	4.9	4.3	4.1	4.0	4.0	4.3
	1.36	1.25	1.42	1.54	1.54	1.58	1.88	1.90	1.67	1.76	1.80	1.69	1.62
100	4.7	4.4	3.9	5.0	5.4	5.8	6.1	5.9	5.3	4.9	4.8	4.8	5.3
	1.54	1.42	1.61	1.75	1.75	1.80	2.15	2.16	1.90	2.00	2.05	1.92	1.84
200	5.7	5.3	4.8	6.1	6.5	7.1	7.4	7.3	6.4	6.0	5.9	5.9	6.4
	1.49	1.37	1.55	1.69	1.69	1.73	2.07	2.08	1.83	1.93	1.98	1.85	1.78
Freq	6.3	5.3	4.1	5.5	7.1	10.3	12.9	12.8	10.1	9.1	8.5	8.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	5.0	188	3.5	82	3.1	54	2.4	26
25	5.5	237	4.2	125	3.8	92	3.2	55
50	5.9	285	4.9	166	4.5	130	3.9	87
100	6.4	378	5.8	260	5.3	198	4.7	131
200	7.1	547	7.2	526	6.5	390	5.7	249

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	5.0	5.2	4.9	4.1	4.3	5.0	5.1	4.8	4.3	3.9	4.2	4.7
	1.57	1.60	1.60	1.48	1.27	1.19	1.49	1.76	1.88	1.92	1.66	1.58	1.54
25	5.1	5.5	5.7	5.3	4.6	4.8	5.5	5.6	5.2	4.7	4.2	4.6	5.2
	1.62	1.64	1.65	1.52	1.31	1.22	1.54	1.81	1.94	1.99	1.71	1.63	1.59
50	5.5	5.9	6.1	5.8	4.9	5.2	5.9	6.0	5.6	5.0	4.6	5.0	5.6
	1.66	1.69	1.69	1.56	1.34	1.25	1.58	1.86	1.99	2.04	1.76	1.67	1.63
100	6.0	6.3	6.6	6.2	5.3	5.5	6.4	6.5	6.1	5.4	4.9	5.4	6.0
	1.61	1.63	1.64	1.51	1.30	1.21	1.53	1.80	1.92	1.98	1.71	1.62	1.58
200	6.6	7.0	7.3	6.8	5.8	6.0	7.1	7.2	6.7	6.0	5.4	5.9	6.6
	1.52	1.55	1.55	1.43	1.23	1.15	1.46	1.71	1.82	1.87	1.62	1.53	1.50
Freq	8.1	9.3	9.0	7.1	5.6	6.6	10.5	13.2	11.7	7.7	5.3	6.1	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.5	3.6	3.1	2.7	3.0	3.5	3.5	3.2	2.8	2.7	3.0	3.2
	1.34	1.36	1.36	1.19	1.04	1.02	1.35	1.51	1.62	1.55	1.37	1.33	1.31
25	4.0	4.2	4.4	3.8	3.3	3.7	4.2	4.3	3.9	3.4	3.2	3.6	3.9
	1.44	1.46	1.47	1.28	1.12	1.10	1.46	1.63	1.74	1.67	1.48	1.44	1.41
50	4.7	4.9	5.1	4.5	4.0	4.4	5.0	5.0	4.5	4.0	3.8	4.2	4.6
	1.62	1.64	1.64	1.44	1.25	1.22	1.63	1.83	1.96	1.88	1.66	1.61	1.58
100	5.6	5.8	6.1	5.4	4.8	5.2	5.9	5.9	5.3	4.8	4.5	5.0	5.5
	1.72	1.74	1.75	1.52	1.33	1.29	1.74	1.95	2.09	2.00	1.76	1.71	1.68
200	6.9	7.2	7.6	6.6	5.8	6.5	7.3	7.3	6.7	5.9	5.6	6.2	6.8
	1.64	1.67	1.67	1.46	1.27	1.24	1.66	1.86	1.99	1.91	1.69	1.64	1.60
Freq	8.6	9.4	8.8	6.3	5.5	7.0	11.9	13.4	10.9	6.5	5.1	6.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.9	3.0	3.1	2.7	2.4	2.7	3.0	3.0	2.8	2.5	2.3	2.7	2.8
	1.36	1.33	1.33	1.19	1.08	1.04	1.36	1.50	1.67	1.55	1.37	1.40	1.31
25	3.6	3.7	3.9	3.4	3.1	3.3	3.8	3.8	3.5	3.1	2.9	3.3	3.5
	1.45	1.42	1.42	1.27	1.15	1.11	1.45	1.60	1.79	1.66	1.46	1.49	1.40
50	4.3	4.4	4.6	4.0	3.7	4.0	4.5	4.5	4.1	3.6	3.4	4.0	4.2
	1.60	1.57	1.57	1.40	1.27	1.22	1.60	1.77	1.98	1.83	1.62	1.65	1.55
100	5.1	5.3	5.6	4.8	4.5	4.9	5.4	5.4	4.9	4.3	4.1	4.7	5.0
	1.75	1.72	1.72	1.53	1.39	1.33	1.76	1.94	2.18	2.01	1.77	1.81	1.70
200	6.3	6.5	6.8	5.9	5.5	6.0	6.6	6.6	6.0	5.3	5.1	5.8	6.2
	1.68	1.65	1.65	1.47	1.33	1.27	1.69	1.86	2.08	1.93	1.70	1.73	1.62
Freq	8.8	9.4	8.8	6.1	5.5	7.2	12.4	13.5	10.6	6.1	5.0	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	2.3	2.4	2.5	2.0	1.8	2.1	2.5	2.4	2.2	1.9	1.8	2.1	2.2
	1.40	1.40	1.38	1.15	1.02	1.06	1.46	1.58	1.69	1.48	1.35	1.35	1.33
25	3.1	3.2	3.4	2.7	2.4	2.9	3.3	3.2	2.9	2.5	2.4	2.8	3.0
	1.48	1.48	1.46	1.22	1.08	1.12	1.54	1.67	1.79	1.56	1.43	1.43	1.41
50	3.8	3.9	4.1	3.3	3.0	3.5	4.0	3.9	3.5	3.0	3.0	3.4	3.6
	1.60	1.61	1.58	1.32	1.16	1.21	1.67	1.81	1.94	1.70	1.54	1.55	1.53
100	4.6	4.8	5.0	4.1	3.7	4.4	4.8	4.8	4.2	3.7	3.6	4.1	4.4
	1.82	1.83	1.80	1.49	1.31	1.37	1.90	2.06	2.21	1.93	1.76	1.76	1.73
200	5.6	5.8	6.1	5.0	4.5	5.3	5.9	5.8	5.1	4.5	4.4	5.0	5.4
	1.76	1.76	1.73	1.44	1.27	1.33	1.83	1.99	2.13	1.86	1.69	1.70	1.67
Freq	9.0	9.4	8.6	5.8	5.6	7.7	12.8	13.4	10.0	5.7	5.0	7.0	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	4.2	121	3.0	54	2.6	36	2.1	17
25	4.6	152	3.6	83	3.2	61	2.7	36
50	5.0	182	4.1	108	3.8	84	3.3	56
100	5.4	242	4.9	167	4.5	127	3.9	84
200	6.0	354	6.1	342	5.5	253	4.8	160

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	6.7	6.9	7.5	7.5	8.0	8.1	8.1	9.7	10.6	10.5	9.6	7.9	9.0
	1.76	1.77	1.68	1.72	1.78	1.73	1.62	1.83	2.09	2.15	2.05	1.76	1.83
25	7.4	7.6	8.2	8.2	8.7	8.8	8.9	10.6	11.5	11.4	10.5	8.6	9.8
	1.81	1.83	1.73	1.77	1.83	1.77	1.65	1.86	2.12	2.19	2.09	1.80	1.86
50	7.9	8.2	8.8	8.8	9.4	9.5	9.5	11.3	12.3	12.2	11.2	9.3	10.5
	1.86	1.88	1.77	1.81	1.88	1.82	1.69	1.90	2.17	2.24	2.14	1.85	1.91
100	8.6	8.9	9.5	9.6	10.1	10.2	10.2	12.0	13.1	13.0	12.1	10.0	11.3
	1.80	1.81	1.72	1.76	1.83	1.77	1.66	1.88	2.14	2.21	2.10	1.81	1.88
200	9.5	9.8	10.4	10.5	11.1	11.1	11.0	13.0	14.1	14.1	13.1	10.9	12.3
	1.71	1.72	1.64	1.67	1.75	1.70	1.60	1.83	2.08	2.14	2.03	1.73	1.82
Freq	4.5	4.4	5.0	5.0	5.3	6.6	8.6	12.3	15.9	15.0	10.7	6.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.6	4.9	5.2	5.1	5.8	5.6	5.8	7.2	7.6	7.4	6.5	5.1	6.3
	1.46	1.51	1.41	1.50	1.57	1.50	1.45	1.73	1.93	1.92	1.74	1.46	1.63
25	5.5	5.9	6.3	6.2	6.9	6.6	6.9	8.4	8.9	8.7	7.7	6.2	7.5
	1.58	1.63	1.50	1.62	1.67	1.59	1.51	1.79	2.00	2.00	1.83	1.57	1.71
50	6.4	6.9	7.2	7.2	7.9	7.7	7.8	9.5	10.1	9.8	8.8	7.2	8.6
	1.77	1.83	1.64	1.82	1.82	1.74	1.62	1.88	2.11	2.12	1.98	1.75	1.83
100	7.7	8.2	8.5	8.6	9.3	8.9	9.1	10.8	11.4	11.2	10.2	8.5	9.9
	1.88	1.95	1.76	1.94	1.96	1.87	1.74	2.02	2.27	2.28	2.12	1.87	1.97
200	9.5	10.2	10.3	10.7	11.2	10.8	10.7	12.5	13.3	13.1	12.1	10.5	11.8
	1.80	1.86	1.69	1.85	1.88	1.79	1.68	1.96	2.20	2.21	2.05	1.78	1.92
Freq	4.3	4.6	5.2	4.9	5.5	6.9	9.2	13.3	16.5	14.1	9.6	5.9	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.0	4.3	4.6	4.5	5.1	4.8	5.1	6.3	6.6	6.4	5.6	4.4	5.5
	1.46	1.54	1.44	1.56	1.59	1.51	1.44	1.76	1.96	1.93	1.73	1.47	1.64
25	4.9	5.4	5.7	5.6	6.3	6.0	6.2	7.7	8.0	7.8	6.8	5.4	6.8
	1.56	1.64	1.51	1.67	1.67	1.60	1.50	1.82	2.02	2.00	1.80	1.57	1.71
50	5.8	6.3	6.7	6.6	7.3	7.0	7.2	8.8	9.2	8.9	7.9	6.4	7.9
	1.73	1.81	1.64	1.84	1.80	1.73	1.59	1.90	2.12	2.11	1.92	1.74	1.82
100	7.0	7.6	7.9	7.9	8.6	8.2	8.4	10.1	10.6	10.3	9.2	7.7	9.2
	1.90	1.99	1.80	2.02	1.98	1.90	1.74	2.07	2.31	2.31	2.11	1.91	1.99
200	8.6	9.3	9.5	9.7	10.3	9.9	9.9	11.8	12.3	12.1	11.0	9.5	10.9
	1.81	1.91	1.73	1.94	1.91	1.83	1.69	2.02	2.25	2.24	2.04	1.83	1.95
Freq	4.2	4.6	5.2	4.9	5.6	7.1	9.4	13.7	16.8	13.7	9.3	5.6	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.1	3.5	3.7	3.5	4.0	3.8	4.0	5.0	5.2	5.0	4.3	3.3	4.4
	1.45	1.56	1.46	1.61	1.59	1.52	1.46	1.80	1.99	1.93	1.69	1.49	1.65
25	4.1	4.6	4.9	4.7	5.3	5.0	5.3	6.5	6.8	6.5	5.6	4.4	5.7
	1.53	1.66	1.52	1.70	1.66	1.60	1.50	1.85	2.05	1.99	1.76	1.58	1.71
50	5.0	5.5	5.9	5.7	6.3	6.0	6.3	7.8	8.0	7.7	6.7	5.3	6.8
	1.66	1.80	1.62	1.85	1.76	1.71	1.58	1.92	2.13	2.08	1.86	1.71	1.80
100	6.1	6.7	7.1	6.9	7.6	7.3	7.4	9.1	9.4	9.1	8.0	6.5	8.1
	1.89	2.05	1.81	2.10	1.96	1.91	1.71	2.05	2.28	2.25	2.05	1.95	1.96
200	7.4	8.2	8.4	8.4	9.1	8.7	8.8	10.6	11.1	10.7	9.5	7.9	9.6
	1.82	1.98	1.77	2.03	1.92	1.87	1.71	2.07	2.31	2.26	2.03	1.88	1.97
Freq	4.1	4.7	5.2	4.9	5.8	7.2	9.7	14.2	17.0	13.3	8.7	5.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.0	661	5.7	272	5.0	178	3.9	86
25	8.7	840	6.7	423	6.0	307	5.1	182
50	9.3	998	7.6	570	7.0	440	6.1	291
100	10.0	1258	8.8	805	8.1	627	7.2	440
200	10.9	1668	10.4	1381	9.6	1070	8.5	734

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	7.0	7.2	7.1	7.3	8.4	9.6	10.3	10.4	10.1	9.4	8.8	9.1
	1.96	1.98	1.88	1.74	1.67	1.88	1.99	1.99	2.04	2.08	2.10	2.13	1.91
25	8.5	7.7	7.8	7.7	8.0	9.1	10.5	11.2	11.3	11.0	10.3	9.6	10.0
	2.02	2.04	1.94	1.79	1.71	1.92	2.03	2.02	2.07	2.12	2.14	2.19	1.95
50	9.1	8.3	8.4	8.3	8.6	9.8	11.2	11.9	12.1	11.8	11.0	10.3	10.7
	2.07	2.10	1.99	1.84	1.76	1.98	2.08	2.07	2.12	2.17	2.20	2.24	2.00
100	9.9	9.0	9.1	9.0	9.3	10.6	12.0	12.8	12.9	12.6	11.8	11.1	11.4
	2.01	2.03	1.92	1.78	1.71	1.92	2.05	2.05	2.09	2.13	2.15	2.18	1.97
200	10.9	9.9	10.1	9.9	10.2	11.6	13.0	13.8	13.9	13.6	12.9	12.2	12.5
	1.90	1.92	1.82	1.69	1.63	1.84	1.98	1.99	2.04	2.07	2.07	2.08	1.91
Freq	5.6	5.3	5.3	4.5	4.7	6.1	8.3	12.1	15.2	14.4	10.8	7.7	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.1	4.9	4.9	4.8	5.1	6.0	7.0	7.3	7.4	7.1	6.5	6.0	6.4
	1.60	1.65	1.54	1.45	1.42	1.69	1.79	1.80	1.86	1.85	1.82	1.81	1.69
25	6.1	5.8	6.0	5.8	6.2	7.2	8.3	8.6	8.7	8.3	7.7	7.2	7.6
	1.73	1.79	1.66	1.56	1.51	1.79	1.86	1.87	1.93	1.94	1.92	1.94	1.78
50	7.1	6.8	6.9	6.8	7.2	8.2	9.3	9.7	9.8	9.4	8.8	8.3	8.7
	1.94	2.01	1.87	1.75	1.67	1.97	1.98	1.97	2.04	2.06	2.09	2.15	1.91
100	8.5	8.1	8.3	8.1	8.4	9.6	10.7	11.1	11.2	10.8	10.2	9.8	10.0
	2.07	2.13	1.99	1.86	1.78	2.11	2.13	2.11	2.19	2.22	2.24	2.30	2.06
200	10.5	10.0	10.3	10.0	10.3	11.6	12.5	12.8	13.0	12.7	12.2	12.0	12.0
	1.98	2.04	1.90	1.78	1.71	2.03	2.06	2.05	2.13	2.15	2.16	2.20	2.02
Freq	5.1	5.6	5.0	4.4	4.9	6.5	8.9	13.2	15.6	13.8	9.8	7.2	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.4	4.3	4.3	4.2	4.5	5.3	6.2	6.4	6.4	6.1	5.6	5.2	5.6
	1.63	1.66	1.54	1.44	1.44	1.72	1.81	1.81	1.88	1.86	1.82	1.81	1.70
25	5.4	5.3	5.4	5.2	5.6	6.5	7.5	7.8	7.8	7.4	6.8	6.5	6.8
	1.74	1.78	1.64	1.54	1.52	1.81	1.87	1.86	1.94	1.94	1.92	1.93	1.78
50	6.4	6.2	6.3	6.1	6.6	7.6	8.6	8.9	9.0	8.6	7.9	7.6	7.9
	1.93	1.97	1.81	1.70	1.66	1.96	1.98	1.95	2.04	2.05	2.07	2.12	1.90
100	7.7	7.4	7.6	7.3	7.8	8.9	9.9	10.2	10.4	9.9	9.3	9.0	9.3
	2.12	2.16	1.99	1.87	1.83	2.16	2.16	2.12	2.22	2.24	2.27	2.33	2.08
200	9.4	9.1	9.3	9.0	9.5	10.8	11.6	11.9	12.1	11.7	11.2	11.0	11.0
	2.03	2.07	1.91	1.79	1.76	2.08	2.10	2.07	2.16	2.17	2.19	2.23	2.04
Freq	4.9	5.7	5.0	4.3	5.0	6.7	9.1	13.6	15.7	13.6	9.4	7.0	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.4	3.4	3.3	3.6	4.2	4.9	5.0	5.1	4.8	4.3	4.1	4.4
	1.64	1.69	1.52	1.44	1.46	1.75	1.82	1.82	1.89	1.87	1.82	1.81	1.71
25	4.4	4.5	4.5	4.3	4.8	5.5	6.3	6.6	6.6	6.2	5.7	5.4	5.7
	1.74	1.78	1.62	1.53	1.53	1.83	1.87	1.87	1.95	1.94	1.90	1.92	1.78
50	5.3	5.4	5.5	5.3	5.8	6.6	7.5	7.8	7.8	7.4	6.8	6.5	6.9
	1.88	1.94	1.75	1.66	1.64	1.96	1.96	1.94	2.03	2.03	2.03	2.07	1.87
100	6.5	6.5	6.7	6.4	7.0	7.9	8.9	9.1	9.2	8.7	8.1	7.8	8.2
	2.15	2.20	1.99	1.88	1.85	2.19	2.11	2.08	2.18	2.21	2.27	2.35	2.05
200	7.9	8.0	8.1	7.8	8.4	9.5	10.4	10.7	10.8	10.3	9.7	9.5	9.7
	2.07	2.13	1.92	1.82	1.80	2.14	2.12	2.10	2.20	2.21	2.22	2.27	2.06
Freq	4.7	5.8	4.9	4.3	5.1	6.9	9.4	14.2	15.9	13.3	8.9	6.7	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.1	650	5.7	265	5.0	173	3.9	84
25	8.8	828	6.8	412	6.1	300	5.1	178
50	9.4	986	7.7	559	7.0	431	6.1	285
100	10.2	1241	8.9	798	8.2	621	7.2	433
200	11.0	1653	10.6	1379	9.8	1066	8.6	729

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.9	7.8	7.8	7.3	6.9	7.4	9.1	10.3	10.4	9.6	8.8	8.2	8.9
	1.88	1.96	1.94	1.86	1.87	1.82	1.97	2.01	1.96	1.90	1.87	1.86	1.85
25	8.6	8.6	8.6	8.0	7.5	8.1	9.9	11.3	11.3	10.5	9.6	8.9	9.7
	1.93	2.03	2.00	1.92	1.93	1.88	2.01	2.04	1.99	1.94	1.92	1.91	1.88
50	9.3	9.2	9.2	8.6	8.1	8.7	10.6	12.0	12.0	11.2	10.3	9.6	10.4
	1.98	2.08	2.05	1.97	1.98	1.93	2.07	2.08	2.03	1.98	1.97	1.96	1.93
100	10.0	10.0	10.0	9.3	8.8	9.4	11.4	12.9	12.8	12.0	11.0	10.3	11.2
	1.92	2.01	1.99	1.91	1.92	1.87	2.02	2.06	2.01	1.95	1.92	1.91	1.90
200	11.1	11.1	11.0	10.2	9.7	10.4	12.4	13.8	13.8	13.0	12.0	11.3	12.2
	1.83	1.90	1.88	1.81	1.81	1.77	1.94	2.00	1.96	1.89	1.85	1.82	1.85
Freq	6.0	6.2	6.1	4.8	4.2	5.3	8.1	12.9	15.8	13.7	9.8	7.0	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.4	5.4	5.4	4.8	4.8	5.2	6.7	7.5	7.3	6.6	6.0	5.6	6.3
	1.60	1.67	1.61	1.57	1.54	1.54	1.79	1.81	1.76	1.67	1.63	1.61	1.63
25	6.5	6.5	6.5	5.8	5.8	6.2	7.9	8.8	8.6	7.8	7.2	6.8	7.4
	1.72	1.80	1.74	1.69	1.67	1.67	1.88	1.88	1.82	1.75	1.73	1.72	1.72
50	7.6	7.6	7.5	6.8	6.7	7.2	9.0	9.9	9.6	8.9	8.2	7.8	8.5
	1.93	2.02	1.95	1.90	1.87	1.87	2.02	1.98	1.92	1.86	1.88	1.90	1.85
100	9.0	9.0	9.0	8.1	8.0	8.6	10.3	11.2	10.9	10.2	9.6	9.2	9.9
	2.05	2.15	2.08	2.03	1.99	1.99	2.17	2.12	2.06	2.00	2.02	2.04	2.00
200	11.2	11.2	11.1	10.0	9.9	10.7	12.3	13.0	12.7	12.0	11.5	11.3	11.8
	1.96	2.06	1.99	1.93	1.90	1.90	2.10	2.06	2.00	1.94	1.94	1.95	1.96
Freq	5.9	6.4	5.9	4.4	4.3	5.8	8.9	14.3	15.9	12.8	8.9	6.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.8	4.7	4.2	4.2	4.5	5.9	6.6	6.3	5.7	5.2	4.9	5.5
	1.62	1.70	1.63	1.59	1.55	1.57	1.82	1.83	1.76	1.68	1.64	1.62	1.65
25	5.9	5.9	5.8	5.2	5.2	5.6	7.2	7.9	7.7	7.0	6.4	6.1	6.7
	1.73	1.82	1.75	1.70	1.66	1.68	1.90	1.88	1.82	1.74	1.72	1.72	1.72
50	6.9	6.9	6.9	6.1	6.1	6.6	8.3	9.1	8.8	8.1	7.5	7.1	7.8
	1.91	2.01	1.94	1.88	1.83	1.86	2.02	1.97	1.90	1.85	1.86	1.88	1.84
100	8.3	8.3	8.2	7.3	7.3	7.9	9.6	10.4	10.1	9.4	8.8	8.4	9.1
	2.10	2.21	2.13	2.06	2.01	2.04	2.21	2.13	2.08	2.02	2.04	2.07	2.02
200	10.2	10.2	10.1	9.0	9.0	9.8	11.4	12.1	11.7	11.0	10.5	10.3	10.8
	2.01	2.12	2.03	1.98	1.93	1.95	2.14	2.08	2.02	1.96	1.97	1.99	1.98
Freq	5.9	6.4	5.8	4.2	4.3	5.9	9.2	14.7	15.9	12.5	8.6	6.4	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.8	3.7	3.2	3.3	3.6	4.7	5.2	4.9	4.4	4.1	3.8	4.3
	1.62	1.73	1.63	1.60	1.54	1.60	1.83	1.85	1.76	1.67	1.63	1.61	1.65
25	4.9	5.0	4.9	4.2	4.4	4.8	6.1	6.7	6.4	5.8	5.3	5.1	5.6
	1.72	1.83	1.72	1.69	1.63	1.70	1.90	1.89	1.81	1.73	1.71	1.70	1.72
50	6.0	6.0	5.9	5.2	5.3	5.8	7.3	8.0	7.6	6.9	6.4	6.1	6.7
	1.86	1.99	1.87	1.83	1.77	1.84	2.00	1.96	1.88	1.81	1.82	1.83	1.81
100	7.2	7.3	7.2	6.2	6.4	7.1	8.6	9.4	8.9	8.2	7.6	7.3	8.0
	2.12	2.26	2.13	2.09	2.02	2.10	2.18	2.08	2.01	1.97	2.04	2.08	1.99
200	8.8	8.9	8.8	7.6	7.8	8.6	10.2	10.9	10.4	9.7	9.2	8.9	9.6
	2.05	2:18	2.05	2.01	1.94	2.02	2.18	2.12	2.03	1.97	1.99	2.01	2.00
Freq	5.9	6.4	5.7	4.1	4.4	6.1	9.8	15.3	15.9	12.0	8.2	6.2	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.9	630	5.6	259	4.9	170	3.8	82
25	8.6	802	6.6	403	6.0	293	5.0	175
50	9.2	956	7.5	545	6.9	420	6.0	279
100	9.9	1207	8.7	778	8.1	604	7.1	423
200	10.8	1610	10.4	1356	9.6	1045	8.5	713

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.5	7.2	7.3	6.9	6.9	7.6	8.4	9.2	9.7	9.8	9.3	8.6	8.6
	1.91	2.06	1.99	1.83	1.88	1.95	1.85	1.84	1.89	1.93	2.02	2.04	1.85
25	8.2	7.9	8.0	7.5	7.5	8.4	9.2	10.1	10.6	10.7	10.1	9.4	9.4
	1.97	2.12	2.05	1.89	1.94	2.01	1.89	1.87	1.92	1.96	2.06	2.10	1.88
50	8.9	8.5	8.6	8.1	8.1	9.0	9.9	10.8	11.3	11.4	10.8	10.0	10.1
	2.02	2.18	2.10	1.94	1.99	2.06	1.94	1.92	1.97	2.01	2.12	2.15	1.94
100	9.6	9.2	9.4	8.8	8.8	9.7	10.6	11.5	12.1	12.2	11.6	10.8	10.9
	1.96	2.11	2.04	1.88	1.93	2.00	1.90	1.89	1.94	1.98	2.07	2.10	1.90
200	10.6	10.2	10.3	9.6	9.7	10.7	11.6	12.4	13.1	13.1	12.6	11.9	11.8
	1.86	2.00	1.93	1.78	1.83	1.89	1.82	1.83	1.88	1.92	1.99	1.99	1.85
Freq	6.0	5.5	5.5	4.6	4.5	5.7	8.2	12.5	15.7	13.8	10.1	7.9	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.0	5.1	5.0	4.6	4.8	5.4	6.1	6.6	7.0	6.9	6.4	5.8	6.1
	1.62	1.74	1.62	1.52	1.60	1.64	1.62	1.65	1.71	1.75	1.78	1.71	1.63
25	6.0	6.1	6.1	5.6	5.8	6.5	7.2	7.8	8.2	8.1	7.6	7.0	7.2
	1.74	1.88	1.75	1.64	1.73	1.77	1.71	1.72	1.77	1.82	1.88	1.84	1.71
50	7.0	7.1	7.0	6.5	6.8	7.5	8.2	8.8	9.3	9.2	8.7	8.1	8.2
	1.96	2.12	1.97	1.85	1.94	1.99	1.85	1.83	1.88	1.93	2.05	2.04	1.85
100	8.3	8.4	8.4	7.7	8.1	8.9	9.6	10.1	10.6	10.5	10.1	9.5	9.6
	2.09	2.25	2.10	1.96	2.07	2.12	1.98	1.96	2.02	2.08	2.20	2.18	2.00
200	10.3	10.5	10.4	9.6	10.0	11.1	11.4	11.9	12.3	12.3	12.1	11.7	11.5
	1.99	2.15	2.00	1.88	1.98	2.03	1.91	1.90	1.96	2.01	2.12	2.09	1.96
Freq	5.6	5.6	5.3	4.3	4.7	6.1	9.0	13.8	16.1	12.6	9.5	7.5	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.3	4.5	4.4	4.0	4.3	4.8	5.3	5.8	6.1	6.0	5.5	5.1	5.3
	1.63	1.78	1.62	1.52	1.62	1.68	1.62	1.66	1.72	1.76	1.80	1.72	1.63
25	5.3	5.6	5.4	4.9	5.3	5.9	6.5	7.0	7.4	7.3	6.8	6.3	6.5
	1.75	1.90	1.74	1.62	1.74	1.80	1.69	1.72	1.78	1.82	1.89	1.83	1.71
50	6.2	6.6	6.4	5.8	6.2	6.9	7.5	8.1	8.5	8.4	7.9	7.3	7.5
	1.94	2.11	1.92	1.79	1.92	1.99	1.81	1.81	1.87	1.92	2.04	2.01	1.83
100	7.4	7.8	7.6	7.0	7.4	8.3	8.8	9.4	9.8	9.7	9.2	8.7	8.8
	2.13	2.32	2.11	1.97	2.11	2.19	1.99	1.98	2.04	2.10	2.24	2.20	2.02
200	9.2	9.6	9.4	8.6	9.2	10.2	10.5	11.0	11.4	11.4	11.1	10.6	10.6
	2.03	2.22	2.02	1.89	2.02	2.09	1.92	1.92	1.98	2.04	2.16	2.12	1.97
Freq	5.4	5.7	5.3	4.2	4.8	6.2	9.3	14.2	16.2	12.2	9.2	7.3	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.3	3.6	3.5	3.1	3.4	3.8	4.2	4.6	4.8	4.7	4.3	3.9	4.2
	1.68	1.80	1.63	1.51	1.66	1.70	1.62	1.68	1.74	1.76	1.81	1.71	1.65
25	4.3	4.7	4.6	4.1	4.5	5.0	5.5	6.0	6.3	6.1	5.6	5.2	5.4
	1.77	1.90	1.73	1.60	1.76	1.80	1.68	1.73	1.78	1.82	1.89	1.80	1.71
50	5.3	5.7	5.5	5.0	5.4	6.0	6.6	7.1	7.4	7.3	6.8	6.3	6.5
	1.93	2.07	1.88	1.74	1.91	1.95	1.77	1.81	1.86	1.91	2.02	1.94	1.81
100	6.4	6.9	6.7	6.0	6.6	7.3	7.8	8.4	8.8	8.6	8.1	7.6	7.8
	2.20	2.36	2.13	1.98	2.17	2.22	1.96	1.95	1.99	2.06	2.27	2.21	1.99
200	7.8	8.4	8.2	7.3	8.0	8.9	9.3	9.9	10.3	10.1	9.7	9.2	9.3
	2.12	2.27	2.06	1.90	2.09	2.14	1.94	1.96	2.01	2.07	2.21	2.13	1.99
Freq	5.2	5.8	5.2	4.1	4.9	6.4	9.7	14.7	16.3	11.7	8.9	7.1	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	7.7	574	5.4	236	4.7	155	3.7	75
25	8.4	730	6.4	368	5.8	268	4.9	159
50	9.0	869	7.3	497	6.7	384	5.8	254
100	9.6	1102	8.5	715	7.8	554	6.9	386
200	10.5	1479	10.2	1262	9.4	971	8.3	658

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	8.2	7.3	6.8	8.0	9.8	9.7	9.5	10.1	10.6	10.1	9.0	8.7	9.4
	1.80	1.75	1.78	1.85	2.06	2.01	2.12	2.16	2.03	1.88	1.81	1.87	1.91
25	9.0	8.0	7.5	8.8	10.7	10.6	10.4	11.0	11.5	11.0	9.9	9.5	10.2
	1.85	1.80	1.84	1.91	2.10	2.05	2.16	2.20	2.06	1.91	1.84	1.91	1.95
50	9.7	8.6	8.0	9.4	11.5	11.3	11.1	11.8	12.3	11.8	10.5	10.2	10.9
	1.90	1.85	1.89	1.96	2.16	2.10	2.22	2.26	2.10	1.95	1.89	1.96	1.99
100	10.4	9.3	8.7	10.2	12.3	12.1	11.9	12.6	13.1	12.6	11.3	11.0	11.7
	1.85	1.79	1.83	1.90	2.12	2.06	2.17	2.22	2.08	1.93	1.86	1.92	1.97
200	11.4	10.3	9.6	11.1	13.3	13.1	13.0	13.7	14.1	13.5	12.2	11.9	12.7
	1.77	1.70	1.73	1.81	2.05	1.99	2.09	2.15	2.03	1.88	1.79	1.85	1.91
Freq	6.8	4.6	3.8	4.4	6.7	9.1	10.5	12.1	12.7	10.9	9.6	8.8	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.6	4.9	4.7	6.0	7.1	6.8	6.7	7.3	7.6	7.0	6.2	6.2	6.6
	1.52	1.48	1.50	1.72	1.84	1.77	1.88	1.94	1.81	1.68	1.60	1.66	1.70
25	6.6	5.9	5.6	7.2	8.4	8.0	8.0	8.6	8.9	8.3	7.4	7.3	7.8
	1.62	1.59	1.62	1.83	1.92	1.85	1.99	2.01	1.87	1.74	1.67	1.75	1.78
50	7.7	6.9	6.6	8.2	9.5	9.1	9.1	9.8	10.0	9.3	8.4	8.4	8.9
	1.78	1.79	1.81	2.01	2.04	1.98	2.15	2.14	1.96	1.83	1.79	1.90	1.91
100	9.0	8.3	7.8	9.6	10.9	10.4	10.5	11.1	11.4	10.6	9.7	9.7	10.3
	1.91	1.90	1.93	2.15	2.19	2.12	2.31	2.30	2.10	1.96	1.93	2.04	2.05
200	10.9	10.2	9.7	11.7	12.7	12.3	12.5	13.1	13.1	12.3	11.5	11.6	12.1
	1.83	1.82	1.84	2.07	2.12	2.05	2.22	2.23	2.04	1.90	1.86	1.96	2.00
Freq	6.1	4.2	3.8	4.6	7.5	9.5	10.7	12.6	12.6	10.3	9.5	8.6	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.8	4.3	4.1	5.3	6.3	5.8	5.9	6.4	6.6	6.0	5.4	5.4	5.8
	1.53	1.49	1.50	1.77	1.85	1.77	1.91	1.95	1.81	1.67	1.59	1.67	1.71
25	5.9	5.3	5.0	6.6	7.6	7.1	7.2	7.8	8.1	7.4	6.6	6.6	7.0
	1.62	1.59	1.61	1.87	1.92	1.85	2.00	2.02	1.86	1.73	1.66	1.76	1.78
50	6.9	6.3	5.9	7.7	8.8	8.2	8.3	9.0	9.2	8.4	7.6	7.7	8.1
	1.76	1.76	1.77	2.03	2.03	1.96	2.15	2.13	1.94	1.81	1.76	1.88	1.89
100	8.2	7.5	7.1	9.0	10.1	9.6	9.7	10.4	10.5	9.7	8.9	9.0	9.5
	1.94	1.93	1.95	2.23	2.21	2.15	2.35	2.33	2.09	1.97	1.93	2.06	2.07
200	9.9	9.2	8.8	10.9	11.8	11.3	11.6	12.1	12.2	11.3	10.5	10.7	11.2
	1.86	1.85	1.87	2.15	2.15	2.08	2.28	2.26	2.05	1.91	1.87	1.99	2.02
Freq	5.9	4.0	3.8	4.6	7.8	9.7	10.8	12.8	12.5	10.1	9.5	8.5	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.7	3.3	3.2	4.3	4.9	4.6	4.6	5.1	5.2	4.7	4.2	4.3	4.5
	1.52	1.49	1.51	1.81	1.86	1.77	1.94	1.96	1.80	1.65	1.60	1.69	1.72
25	4.9	4.4	4.3	5.6	6.4	5.9	6.1	6.6	6.8	6.1	5.5	5.6	5.9
	1.60	1.58	1.60	1.89	1.91	1.83	2.01	2.01	1.85	1.70	1.67	1.76	1.78
50	5.9	5.3	5.2	6.7	7.7	7.1	7.2	7.9	8.0	7.2	6.6	6.7	7.1
	1.72	1.72	1.74	2.02	1.99	1.93	2.13	2.10	1.91	1.77	1.76	1.87	1.87
100	7.1	6.4	6.3	8.0	9.0	8.4	8.6	9.3	9.4	8.5	7.8	8.0	8.4
	1.95	1.95	1.98	2.27	2.15	2.10	2.35	2.26	2.02	1.90	1.93	2.06	2.03
200	8.6	7.9	7.7	9.7	10.6	10.0	10.2	10.9	11.0	10.0	9.3	9.5	9.9
	1.88	1.88	1.90	2.21	2.16	2.10	2.33	2.28	2.05	1.92	1.92	2.04	2.04
Freq	5.5	3.9	3.8	4.9	8.1	9.9	10.9	13.0	12.4	9.8	9.4	8.4	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.3	701	5.9	289	5.1	189	4.1	92
25	9.1	893	7.0	449	6.3	327	5.3	195
50	9.7	1063	7.9	606	7.2	469	6.3	312
100	10.4	1332	9.1	854	8.4	667	7.4	472
200	11.3	1758	10.7	1448	9.9	1127	8.8	781

Roughness Class 0

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	7.8	7.2	6.9	6.9	6.9	8.4	10.3	11.4	11.3	10.5	9.1	8.3	9.5
	1.95	1.88	1.77	1.70	1.69	1.77	1.96	2.15	2.20	2.05	1.92	1.91	1.87
25	8.6	7.9	7.6	7.6	7.6	9.1	11.3	12.4	12.4	11.4	9.9	9.0	10.3
	2.01	1.94	1.83	1.75	1.75	1.81	1.98	2.18	2.23	2.08	1.96	1.96	1.90
50	9.2	8.5	8.1	8.2	8.2	9.8	12.0	13.2	13.1	12.2	10.6	9.7	11.0
	2.06	1.99	1.88	1.80	1.79	1.87	2.03	2.22	2.27	2.13	2.02	2.02	1.94
100	9.9	9.2	8.8	8.9	8.8	10.5	12.8	14.1	14.0	13.0	11.4	10.4	11.8
	2.00	1.93	1.81	1.74	1.74	1.82	2.00	2.20	2.25	2.10	1.98	1.96	1.92
200	11.0	10.1	9.7	9.7	9.7	11.4	13.8	15.1	15.1	14.0	12.4	11.5	12.8
	1.89	1.83	1.72	1.65	1.65	1.75	1.95	2.15	2.20	2.05	1.90	1.87	1.88
Freq	5.5	4.3	4.0	4.7	5.5	8.0	11.9	14.8	14.5	11.1	8.6	7.2	100.0

Roughness Class 1

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	5.3	4.8	4.8	4.8	4.7	6.2	7.6	8.3	8.0	7.2	6.2	5.7	6.7
	1.65	1.54	1.47	1.42	1.42	1.66	1.80	2.03	1.98	1.80	1.68	1.63	1.68
25	6.4	5.8	5.8	5.7	5.7	7.4	9.0	9.7	9.4	8.5	7.4	6.8	7.9
	1.78	1.66	1.59	1.53	1.53	1.75	1.86	2.08	2.04	1.87	1.77	1.75	1.75
50	7.5	6.8	6.7	6.7	6.7	8.5	10.1	10.9	10.6	9.6	8.4	7.8	9.0
	2.00	1.87	1.78	1.72	1.72	1.89	1.95	2.18	2.13	1.98	1.92	1.95	1.87
100	8.9	8.1	8.0	8.0	8.0	9.8	11.4	12.3	11.9	10.9	9.8	9.3	10.4
	2.13	1.99	1.90	1.83	1.83	2.03	2.09	2.34	2.29	2.12	2.06	2.08	2.01
200	11.0	10.0	9.9	9.9	9.9	11.7	13.1	14.1	13.8	12.7	11.7	11.4	12.2
	2.03	1.90	1.81	1.74	1.75	1.96	2.03	2.28	2.23	2.06	1.98	1.99	1.99
Freq	5.0	4.2	4.0	5.0	5.6	8.9	12.8	15.2	14.0	10.2	8.3	6.8	100.0

Roughness Class 2

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	4.7	4.2	4.2	4.1	4.1	5.5	6.7	7.2	7.0	6.2	5.3	4.9	5.8
	1.67	1.54	1.48	1.42	1.43	1.70	1.83	2.07	1.98	1.79	1.68	1.64	1.69
25	5.8	5.2	5.2	5.2	5.1	6.8	8.2	8.8	8.4	7.6	6.6	6.1	7.1
	1.79	1.64	1.58	1.52	1.53	1.77	1.88	2.12	2.03	1.85	1.76	1.75	1.75
50	6.8	6.1	6.1	6.1	6.1	7.8	9.3	10.0	9.7	8.7	7.6	7.1	8.3
	1.98	1.81	1.74	1.68	1.69	1.90	1.95	2.21	2.12	1.95	1.90	1.92	1.86
100	8.1	7.3	7.3	7.3	7.3	9.1	10.7	11.4	11.0	10.0	8.9	8.5	9.6
	2.18	1.99	1.92	1.84	1.86	2.08	2.10	2.37	2.29	2.13	2.08	2.11	2.02
200	10.0	9.0	9.0	9.0	9.0	10.9	12.3	13.2	12.8	11.7	10.7	10.4	11.3
	2.08	1.91	1.83	1.76	1.77	2.01	2.06	2.34	2.24	2.07	2.01	2.03	2.01
Freq	4.8	4.1	4.0	5.1	5.7	9.2	13.1	15.4	13.9	9.8	8.2	6.7	100.0

Roughness Class 3

z	0	30	60	90	120	150	180	210	240	270	300	330	Total
10	3.6	3.3	3.3	3.3	3.3	4.4	5.4	5.7	5.4	4.8	4.2	3.8	4.6
	1.66	1.52	1.46	1.44	1.46	1.74	1.85	2.10	1.96	1.76	1.69	1.65	1.69
25	4.8	4.3	4.3	4.4	4.4	5.8	7.0	7.4	7.1	6.2	5.4	5.1	6.0
	1.76	1.62	1.54	1.52	1.54	1.81	1.89	2.14	2.01	1.81	1.76	1.74	1.75
50	5.8	5.3	5.3	5.3	5.3	6.9	8.2	8.8	8.3	7.4	6.5	6.1	7.2
	1.91	1.75	1.67	1.65	1.67	1.90	1.96	2.22	2.08	1.89	1.87	1.88	1.83
100	7.0	6.4	6.4	6.5	6.4	8.2	9.6	10.2	9.8	8.7	7.8	7.4	8.5
	2.18	1.99	1.90	1.88	1.90	2.09	2.07	2.35	2.21	2.04	2.09	2.14	1.99
200	8.5	7.8	7.8	7.9	7.9	9.8	11.2	11.9	11.4	10.2	9.4	9.0	10.0
	2.10	1.92	1.83	1.81	1.83	2.07	2.10	2.38	2.24	2.05	2.05	2.06	2.01
Freq	4.7	4.1	4.1	5.2	5.8	9.7	13.5	15.6	13.6	9.4	8.0	6.5	100.0

z	Class 0		Class 1		Class 2		Class 3	
10	8.4	748	6.0	306	5.2	201	4.1	97
25	9.2	953	7.1	476	6.4	348	5.4	207
50	9.8	1133	8.0	645	7.3	498	6.4	331
100	10.5	1415	9.2	902	8.5	709	7.5	500
200	11.4	1850	10.8	1500	10.0	1177	8.9	820

Part III
THE MODELS AND THE ANALYSIS

Chapter 8

The Wind Atlas model

This chapter presents the physical and statistical models employed for the Atlas. After the description of the different physical and statistical modelling tools, the more practical details related to data handling and the preparation of descriptions of anemometric conditions are treated. Finally, some discussion is devoted to uncertainties and possible errors in the data source and in the model.

In the course of developing the present model, a number of modelling concepts were tested. Some were actually used at a stage in the development of the final Wind Atlas model, but were later abandoned. Some of these approaches are published elsewhere, e.g. Petersen et al. (1984), Petersen and Troen (1986), and Sacré (1987).

8.1 The physical basis

As already described in the introduction to this book, the Wind Atlas concept builds upon the use of a set of models for the correction of measured wind data and an analysis of the corrected data in terms of their frequency distributions. In principle the correction can be performed on the basis of either a time series, thus transforming each measured value, or by suitable transformation of the frequency distributions. The Wind Atlas work was initially concentrated on the time-series approach. The transformation of the time series has applications beyond the purpose of the Atlas; one such application is the building of realistic site-specific time series for use in simulation studies as described in Petersen (1986). The present model is based on the transformation of frequency distributions. The integrated computer model used in the analysis is called the *Wind Atlas Analysis and Application Programme* (WA^{s}P). The submodels are described below.

Surface-layer similarity laws

The layer closest to the ground is called the atmospheric boundary layer. The layer extends up to about 100 m on clear nights with low wind speeds and up to more than 2 kilometres on a fine summer day. The lowest part of this layer is called the surface layer, which is sometimes defined as a fixed fraction, say 10% of the boundary layer depth. For the purpose of climatology relevant to wind power utilization, we can neglect the lowest wind speeds so only situations where the atmospheric boundary layer extends to approximately 1 km and surface-layer physics apply in the lowest 100 m of the layer are of concern.

At high wind speeds the wind profile over flat and reasonably homogeneous terrain is well modelled using the logarithmic law:

$$u(z) = \frac{u_*}{\kappa} \ln \frac{z}{z_0} \tag{8.1}$$

where $u(z)$ is the wind speed at height z above ground level, z_0 is the surface roughness length, κ is the von Kármán constant, taken here as 0.40, and u_* is the so-called friction velocity related to the surface stress τ through the definition

$$|\tau| = \rho\, u_*^2 \tag{8.2}$$

where ρ is the air density. Even at moderate wind speeds, deviations from the logarithmic profile occur when z exceeds a few tens of metres. Deviations are caused by the effect of buoyancy forces in the turbulence dynamics; the surface roughness is no longer the only relevant surface characteristic but has to be supplemented by parameters describing the surface heat flux. With surface cooling at night time, turbulence is lessened causing the wind profile to increase more rapidly with height; conversely, daytime heating causes increased turbulence and a wind profile more constant with height. Similarity expressions for these more general profiles are given by:

$$u(z) = \frac{u_*}{\kappa}\left[\ln(z/z_0) - \psi(z/L)\right] \tag{8.3}$$

where ψ is an empirical function (Businger, 1973; Dyer, 1974). The new parameter introduced in this expression is the so-called Monin-Obukhov length L:

$$L = \frac{T_0}{\kappa g}\,\frac{c_p u_*^3}{H_0} \tag{8.4}$$

where T_0 and H_0 are the surface absolute temperature and heat flux, respectively, c_p is the heat capacity of air at constant pressure, g the acceleration of gravity and the remaining quantities are defined above. The inclusion of the effects of surface heat flux in the present model is described in section 8.2.

The geostrophic drag law and the geostrophic wind

The winds in the atmospheric boundary layer can be considered to arise from pressure differences caused mainly by "synoptic" activity, i.e. the passing of high and low pressure systems. As the boundary layer structure has a rather rapid response to changes in pressure forcing, an approximate balance is found between the pressure gradient force and the frictional force at the surface of the earth. This balance can be theoretically derived under idealised conditions of stationarity, homogeneity and barotrophy (the pressure gradient being constant over the depth of the boundary layer). For conditions of neutral stability the balance was already described by Rossby and Montgomery (1935). The result is usually expressed as a relation - called the geostrophic drag law - between the surface friction velocity u_* and the so-called geostrophic wind G:

$$G = \frac{u_*}{\kappa}\sqrt{\left(\ln\left(\frac{u_*}{fz_0}\right) - A\right)^2 + B^2} \qquad \sin\alpha = -\frac{Bu_*}{\kappa G} \tag{8.5}$$

in which α is the angle between the near-surface winds and the geostrophic wind, f is the Coriolis parameter and A and B are empirical constants (here $A = 1.8$, $B = 4.5$). The geostrophic wind can be calculated from the surface pressure gradient and is often close to the wind speed observed by radiosondes above the boundary layer. The geostrophic drag law can be extended to conditions of non-neutral stability in which case the above constants A and B become functions of the stability parameter μ defined by:

$$\mu = \frac{\kappa u_*}{fL} \tag{8.6}$$

8.2 The stability model

The stability modifications of the logarithmic wind profile are often neglected in connection with wind energy, the justification being the relative unimportance of the low wind speed range. The present model treats stability modifications as small perturbations to a basic neutral state.

In order to take into account in an approximate manner the effects of varying the surface heat flux without the need for detailed modelling of each individual wind profile, a simplified procedure is adopted which only requires input in the form of the climatological average and root-mean-square of the surface heat flux.

The model is derived from the geostrophic drag law and the wind speed profile by a first order expansion in surface heat flux from the neutral state. The differential of Eq. 8.5 is (keeping G, z_0, and f constant):

$$dG = 0 = \frac{du_*}{u_*}\,G - \frac{u_*^2}{\kappa^2 G}\left[\left(\ln\frac{u_*}{fz_0} - A(\mu)\right)\left(\frac{du_*}{u_*} - \frac{dA}{d\mu}d\mu\right) + B\,\frac{dB}{d\mu}d\mu\right] \qquad (8.7)$$

Using Eqs. 8.5 and 8.4 and inserting the neutral values of the various coefficients

$$A(0) \simeq 1.8 \qquad B(0) \simeq 4.5$$

$$\frac{dA}{d\mu} \simeq -0.2 \qquad \frac{dB}{d\mu} \simeq +0.2$$

and disregarding the small terms, the following relation is found:

$$\frac{du_*}{u_*} \simeq \left[\frac{cg}{fT_0 c_p \rho G^2}\right] dH \qquad (8.8)$$

with the numerical constant $c \simeq 2.5$. This equation is used to evaluate the offset from the neutral value of u_*, taking the climatological mean value of the surface heat flux as dH, and to evaluate the root-mean-square of fluctuations of u_* using the rms heat flux for dH. In this application the geostrophic wind speed G is taken equal to the value where wind speed frequency distribution has a maximum in energy density, see Section 8.6.

The differential of the wind profile, Eq. 8.3, is:

$$du(z) = \frac{du_*}{\kappa}\left[\ln(z/z_0) - \psi(z/L)\right] - \frac{u_*}{\kappa}\frac{d\psi}{dL}\frac{dL}{dH}dH \qquad (8.9)$$

Inserting neutral values of the coefficients as above and using Eq. 8.8, an expression is obtained for the height above ground z_m where the first order effects of surface heat flux modulations vanish, and as a consequence there is a minimum in the wind speed variance (setting $du(z_m) = 0$) results, viz.

$$\frac{z_m}{\ln(z_m/z_0)} = \left(\frac{c}{a\kappa}\right)\frac{u_*^3}{fG^2} \qquad (8.10)$$

where the new numerical constant a is the slope at neutral of the ψ-function with a value between 4 and 5 depending on whether expressions for stable or unstable conditions are used. Using the simplified neutral drag law (Jensen et al., 1984):

$$\frac{u_{*0}}{G} = \frac{0.5}{\ln(\mathrm{Ro}) - A(0)} \qquad (8.11)$$

Eq. 8.10 can be more elegantly expressed as:

$$\frac{z_m/z_0}{\ln(z_m/z_0)} \simeq \text{constant} \cdot \mathrm{Ro}(\ln(\mathrm{Ro}) - A(0))^{-3} \tag{8.12}$$

where the constant $\simeq$ 0.1 and the surface Rossby number is defined by:

$$\mathrm{Ro} = \frac{G}{f z_0} \tag{8.13}$$

Finally this expression can be approximated with a power law:

$$z_m/z_0 \simeq \alpha \cdot \mathrm{Ro}^{\beta} \tag{8.14}$$

where the constants used are $\alpha = 2.0 \cdot 10^{-3}$ and $\beta = 0.9$. It is noteworthy that the height z_m is essentially constant over large areas because of the weak dependency of z_0 ($\sim z_0^{0.1}$ power). An exception is encountered at coasts, where z_m over sea is found to be roughly half of the over-land value.

The effects of non-neutral stabilities are modelled through their effects on the vertical profile of the climatological mean value and standard deviation of wind speed using the above expressions.

The height of minimum variance z_m is determined from Eq. 8.14. At this height the relative deviation from the neutral value of the mean speed is determined as a sum of the deviation caused by an average heat flux offset denoted ΔH_{off} and a contribution from the varying heat flux ΔH_{rms}:

$$\frac{\Delta u(z_m)}{u_0(z_m)} = \frac{\Delta u_*}{u_{*0}} - \frac{\psi(z_m/L_{off}) + \psi(z_m/L_{rms})}{\ln(z_m/z_0)} \tag{8.15}$$

where L_{off} is the Monin-Obukhov length corresponding to ΔH_{off} and L_{rms} corresponds to $F_{rms}\Delta H_{rms}$. The factor F_{rms} is a form factor which accounts for the fact that because of the difference in the form of the ψ-function from stable to unstable conditions there will be on the average a bias toward higher values of wind speed at the height z_m. This can be seen from the explicit forms which are here taken as (Jensen et al., 1984):

$$\psi(z/L) = \begin{cases} \left(1 - 16\frac{z}{L}\right)^{1/4} - 1 & \text{for unstable conditions} \\ -4.7\,\frac{z}{L} & \text{for stable conditions} \end{cases} \tag{8.16}$$

The much smaller variation with z of the unstable profile causes the wind speed at z_m to be displaced to the unstable side on the average even in the case where there is a zero average surface heat flux (Fig. 8.1). The effective positive heat flux is assumed to be related to the rms-value by the factor F_{rms}. Here a value of 0.6 is adopted.

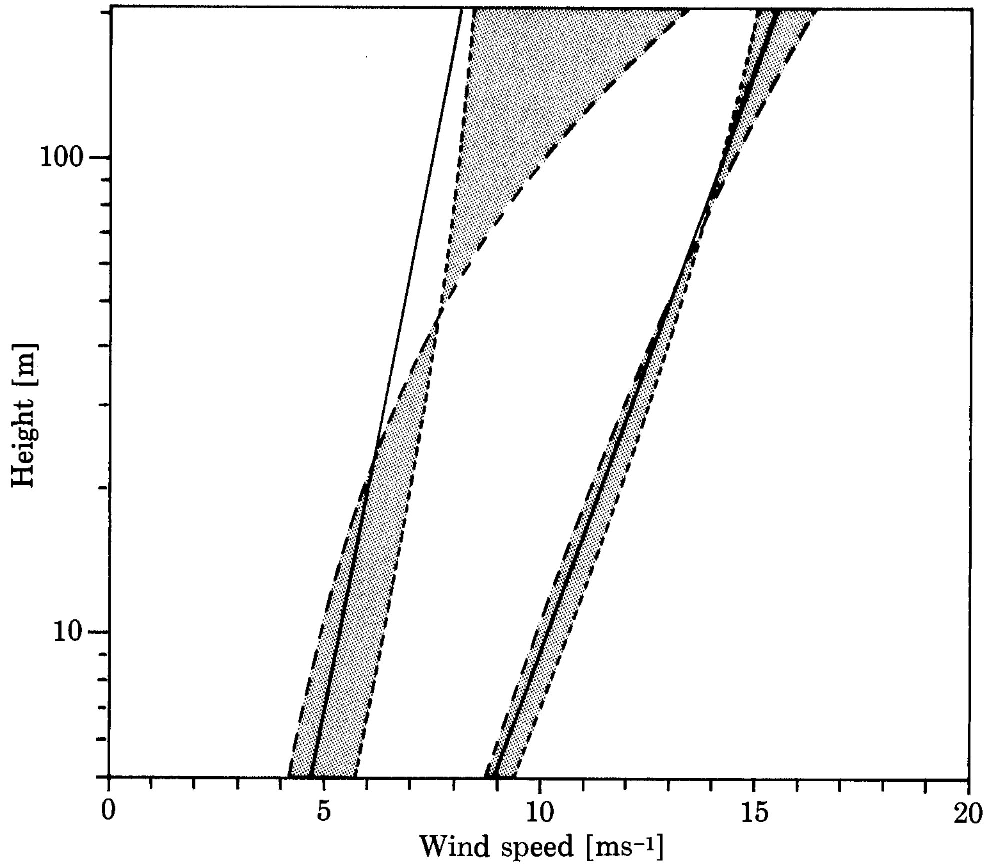


Figure 8.1: Wind profile characteristics: graphs to the left show a range of wind speed profiles (shaded area) corresponding to a constant geostrophic wind speed of 10 m s^{-1} and a typical range of surface heat flux. The graphs to the right correspond to G = 20 m s^{-1} and the same range of surface heat flux.

The vertical variation of the relative mean deviation of mean speed u and standard deviation σ_u are finally specified in the form:

$$u(z) = u_0(z)\left(1 + \frac{\Delta u(z_m)}{u_0(z_m)}(1 - f(z)) + \frac{\Delta u_{*off}}{u_{*0}}\right) \tag{8.17}$$

$$\sigma_u(z) = \sigma_{u0}(z)\left(1 + \frac{\Delta u_{*off}}{u_{*0}}\,|f(z)|\right) \tag{8.18}$$

with the profile function $f(z)$ derived from the first order expansion of $u(z)$:

$$f(z) = 1 - \frac{z}{z_m}\frac{\ln(z_m/z_0)}{\ln(z/z_0)} \tag{8.19}$$

These expressions are used in the analysis to calculate the degree of "contamination" by stability effects in the input data and to reintroduce proper values of contamination when calculating conditions at different heights and surface conditions. In particular a data set from a meteorological station situated at sea can be used to estimate over-land wind conditions taking into account differences in the heat flux parameters for over-land and over-sea conditions.

In this connection coastal areas are treated as the intermediate between over-land and over-sea areas. This is done by considering the distance to the coast in the upwind direction (x) and applying the stability corrections pertaining to over-land and over-sea conditions weighted with a factor w:

$$w = \frac{\min(x,c)}{c} \tag{8.20}$$

where c is the width of the coastal zone, taken here to be 10 km. A more detailed account of the application of the stability model is given in Section 8.7.

8.3 The roughness change model

The logarithmic wind profile applies only if the upwind terrain is reasonably homogeneous. If this is not the case, deviations will be observed and it is not possible to assign a unique roughness length to the terrain. Even though "effective" roughness lengths can be assigned by different methods, these will depend on the height of observation. An exception to this is the effective roughness length implicitly defined by the geostrophic drag law.

The average surface stress and surface wind speed must depend on surface conditions only up to a certain upstream distance; distant obstacles are "forgotten" by the tendency of the boundary layer to approach equilibrium between the pressure gradient force and friction. The distance scale involved is proportional to the Rossby radius G/f and is of the order of 10-100 km. For the wind frequency distribution it is assumed here that it is sufficient to consider surface conditions out to distances of the order of 10 km. From simple considerations pertaining to the surface layer, it is possible in the case of small-scale terrain inhomogeneities to model the change of surface stress which occurs when wind flows from a surface characterized by a roughness length z_{01} to another surface with a roughness of z_{02}. In this case an internal boundary layer (IBL) grows downwind from the roughness change; considering a point at a distance x downwind from the change, the IBL has grown to a height h given by (Panofsky, 1973):

$$\begin{aligned} \frac{h}{z_0'}\left(\ln\frac{h}{z_0'} - 1\right) &= \text{constant} \cdot \frac{x}{z_0'} \\ z_0' &= \max(z_{01}, z_{02}) \end{aligned} \tag{8.21}$$

Above h no change is felt whereas the wind profile has been perturbed in the layer below h. The value of the constant is here 0.9. It is empirically found that the change of surface friction velocity is well modelled using the following relation which can be derived from matching of neutral wind profiles at the height h:

$$\frac{u_{*2}}{u_{*1}} = \frac{\ln(h/z_{01})}{\ln(h/z_{02})} \tag{8.22}$$

where u_{*2} is the surface friction velocity at the point considered and u_{*1} the surface stress upwind from the change. The wind profile is perturbed in the IBL and the surface friction velocity cannot be calculated from observed wind speeds using the logarithmic profile. However, experimental evidence (Sempreviva et al., 1989), as well as results from numerical models (Rao et al., 1974), show that the perturbed profile can be well modelled with three logarithmic parts:

$$u(z) = \begin{cases} u' \dfrac{\ln(z/z_{01})}{\ln(c_1 h/z_{01})} & \text{for } z \geq c_1 h \\[2ex] u'' + (u' - u'') \dfrac{\ln(z/c_2 h)}{\ln(c_1/c_2)} & \text{for } c_2 h \leq z \leq c_1 h \\[2ex] u'' \dfrac{\ln(z/z_{02})}{\ln(c_2 h/z_{02})} & \text{for } z \leq c_2 h \end{cases} \tag{8.23}$$

where $u' = (u_{*1}/\kappa)\ln(c_1 h/z_{01})$, $u'' = (u_{*2}/\kappa)\ln(c_2 h/z_{02})$ and $c_1 = 0.3$, $c_2 = 0.09$. From this equation and with the aid of Eq. 8.22 the surface friction velocity u_{*2} corresponding to a measured wind speed can be related to the friction velocity upstream of a change in surface roughness. For more roughness changes Eq. 8.22 can be applied in sequence, and thus a measured wind speed can be used for calculating the surface friction velocity far upstream. However, successive roughness changes must not occur too close to each other and therefore the following distance rule is applied. If x_n is the distance to the nth change in surface roughness, then the upstream roughness must be estimated as an average covering the area between the distance x_n and $2\,x_n$ in the azimuth sector considered. The factor 2 is somewhat arbitrary, and the rule may be deviated from in cases where clear roughness boundaries are found, e.g. at a coastline.

Moving further upstream, the roughness change model just described will give results deviating from reality because it does not incorporate the above-mentioned boundary layer approach to equilibrium. As was the case with stability corrections, the discrepancies are considered to be small perturbations and a simple model is constructed by considering the asymptotic behaviour. The far-upstream surface conditions must lose importance as x/D becomes large, where D is the chosen equilibrium distance (here taken to be 10 km) and also the above surface layer relations must apply for x much smaller than D. This behaviour is obtained by a simple weighting of the roughness changes by a factor W_n:

$$W_n = \exp\left(-\frac{x_n}{D}\right) \tag{8.24}$$

Instead of considering a change from z_{0n} to z_{0n+1} at distance x_n the value $\ln(z_{0n}) + W_n \ln(z_{0n+1}/z_{0n})$ substitutes $\ln(z_{0n+1})$. By application of this weighting in sequence, a value of the surface friction velocity far upstream is obtained together with a value of the corresponding equilibrium surface roughness to which the geostrophic drag law applies.

8.4 The shelter model

The frictional effect of a land surface is caused by drag on surface-mounted obstacles ranging from individual sand grains, grass, leaves etc. to large trees and buildings. Their collective effect is modelled through the surface roughness length as described in Chapter 3 and the sections above. Close to an individual obstacle, at distances comparable to the height of the obstacle and at heights likewise comparable to the height of the obstacle, the wind profile is perturbed, particularly in the downstream wake, and the object must be treated separately. In the wake immediately behind a blunt object, such as a row of trees or a house (less than five object heights downstream and at heights less than twice the height of the object) the details of the object exert a critical influence on the effects. The wake behind a building depends for example on the detailed geometry of the roof and the incidence angle of the wind, to mention two parameters. In addition, wakes from other nearby objects may interfere, causing the problem to become very complicated.

The main reason for addressing the problem here is that some of the meteorological data sets used in the present study come from meteorological stations at which the wind data are influenced by nearby obstacles. As far as the application of the Wind Atlas in siting is concerned, the problems are usually small.

In the light of these remarks, the shelter model constructed for use in the analysis should be seen as a tool for correcting data influenced by single obstacles that are sufficiently far away to make the perturbations small and to avoid the intricacies of the nearby wakes.

For simple two-dimensional semi-infinite obstacles such as long rows of trees, walls, or hedges, the expressions given by Perera (1981) obtained from wind-tunnel studies are used:

$$\frac{\Delta u}{u} = 9.8 \left(\frac{z_a}{h}\right)^{0.14} \frac{x}{h} (1 - P)\eta \exp(-0.67\eta^{1.5}) \tag{8.25}$$

where

$$\eta = \frac{z_a}{h} \left(\frac{0.32}{\ln(h/z_0)} \cdot \frac{x}{h}\right)^{-0.47} \tag{8.26}$$

and

P = porosity = open area/total area
h = height of obstacle
z_a = height considered (anemometer)
x = downstream distance

With finite obstacle lengths and skew incidence of the wind, the sheltering of an obstacle will in general be different. In Chapter 3 some simple guidelines were indicated; however, the model actually used in the analysis is slightly more refined.

For each of a number of radial lines or rays originating from the point considered, the distances to and heights of objects crossed by the ray are noted. If a single ray crosses several obstacles each of these crossings is initially treated as a single semi-infinite obstacle. Starting with the most distant one, the shelter on all downstream obstacles is calculated in sequence. If objects are so close to each other that their zones of separation join, the downstream sheltering is reduced by the relative area of the downstream obstacle which is embedded in the separation zone of the upstream obstacle.

In this connection the separated zone upwind of a two-dimensional obstacle is considered to be limited by a straight line from the top of the obstacle down to the surface at a distance twice the height of the obstacle, and similarly downstream to a distance of five times the height.

Subsequent to this calculation of the shelter at the point considered from the sequence of objects, the sheltering for each ray is mixed with neighbouring values. This is done to model the actual mixing of momentum deficit at the edge of the wake. Finally, the average shelter is calculated over an azimuth sector by summing up the sheltering calculated on each ray in the azimuth sector. Here eight rays are used per 30° azimuth sector and an effective lateral spreading over an angle of 12°.

8.5 The orographic model

Like the change-of-roughness and shelter models, the orographic model is used to correct measured wind data for the effect of local terrain inhomogeneities; in the present case this means differences in terrain height around the meteorological stations. Emphasis is placed on the effects of terrain undulations with horizontal scales up to several tens of kilometres, and the model was especially developed to serve this purpose. It has strong similarities with the MS3DJH family of models based on the analysis of flow over hills by Jackson and Hunt (1975). Readers who wish to become acquainted with these models should consult the papers by Walmsley et al. (1982), Troen and de Baas (1987). The model is different, however, in a number of respects, the most important being the high resolution and polar representation.

The first step in the model is the calculation of the potential flow perturbation induced by the terrain and corresponding to a unit wind vector in the undisturbed wind direction. This proceeds as follows: the velocity perturbation is related to the potential by:

$$\vec{u} = \nabla \chi \tag{8.27}$$

where χ is the potential and $\vec{u}$ the three-dimensional vector of velocity perturbations $\vec{u} = (u,v,w)$.

If vanishing potential is assumed at a given outer model radius R, a general solution to the potential flow problem in polar coordinates can be expressed as a sum in terms of the form:

$$\chi_j = K_{nj} J_n \left(c_j^n \frac{r}{R} \right) \exp(in\phi) \exp\left(-c_j^n \frac{z}{R} \right) \tag{8.28}$$

where K_{nj} are arbitrary coefficients, J_n the nth order Bessel function, r radius, ϕ azimuth, z height, and c_j^n are the ith zero of J_n. For a specific problem, the coefficients are determined by the boundary conditions, which are here the surface kinematic boundary condition:

$$w_0 = \left. \frac{\partial}{\partial z}\chi \right|_{z=0} = \vec{u}_0 \cdot \nabla h(r,\phi) \tag{8.29}$$

where w_0 is the terrain-induced vertical velocity, $\vec{u}_0$ the basic state velocity vector and h the height of terrain. The functions $J_n\left(c_j^n \frac{r}{R}\right)$ form an orthogonal set of radial functions (Fourier-Bessel series) for each n, and the azimuth representation $\exp(in\phi)$ likewise forms an orthogonal set (Fourier series). The coefficients K_{nj} can therefore be calculated independently by projecting the right-hand side of Eq. 8.29 onto this basis of functions. The mathematical details of these transforms are described in Oberhettinger (1973).

The polar representation has important advantages over the more common Cartesian as used in the above-mentioned models, while maintaining the advantages of spectral decomposition. By defining the model centre to coincide with the point of interest, it is possible to concentrate the model resolution there and also to restrict the calculations to the perturbation at this point. For the centre point $r = 0$, the following solution is found:

$$\nabla \chi_j = \frac{1}{2}\,(1,i)\,K_{1j}\,\frac{c_j^1}{R}\exp\left(-c_j^1\frac{z}{R}\right) \tag{8.30}$$

The final result of the first step in the model is thus a series of coefficients K_{1j} from which the solution of the potential flow perturbation is given as a sum of the terms stated in Eq. 8.30. Each term has an associated horizontal scale $L_j = R/c_j^1$, which is also the characteristic depth to which the perturbation penetrates.

The second step in the model consists of a modification of the potential flow solution to accommodate in an approximate sense the effects of surface friction.

Potential flow implies a balance between the pressure gradient force and advection of momentum in the equations of momentum and vanishing turbulent momentum transfer. Near the surface the turbulent transfer cannot be neglected. The deviation from the potential flow behaviour is restricted to a layer whose depth is of the order l_j with $l_j \ll L_j$. In the present model the value of l_j is determined following Jensen et al. (1984) as:

$$l_j = 0.3 \cdot z_{0j}\left(\frac{L_j}{z_{0j}}\right)^{0.67} \tag{8.31}$$

where z_{0j} is the surface roughness length of the scale considered. For homogeneous conditions $z_{0j} = z_0$. For inhomogeneous sites the surface roughness length is taken as an exponentially weighted average from $r = 0$ to $r = 5L_j$ in the upwind direction (weighting $\ln(z_0)$).

For heights much smaller than l_j, turbulent transfer forces a balance between stress and wind shear, leading to a logarithmic profile of the velocity perturbation. For heights comparable with l_j maximum flow perturbation occurs, and this perturbation exceeds the value predicted from potential flow. In the present model the perturbation profile is modelled for each term in the above expansion by assigning a perturbation to the height z of magnitude Δu_j:

$$\frac{\Delta \vec{u}_j(z)}{|u_0(z)|} = \frac{|u_0(L_j)|^2}{|u_0(z_j')|^2}\nabla \chi_j \tag{8.32}$$

where $u_0(z)$ is the basic state velocity at height z and z_j' is equal to $\max(z,\ l_j)$.

The calculation of the coefficients K_{1j} through the projection method involves numerical integrations over azimuth and radius. This is performed on a grid illustrated in Fig. 8.2. The radial grid size is smallest at the centre and is increased by a constant factor (= 1.06) outwards for each grid cell. In principle, the necessary input is the height of terrain at each grid point, but a much more convenient representation of the terrain height is the contour lines (lines of constant height) as given on standard topographical maps. The model was designed, therefore, to directly accept arbitrarily chosen contour lines as input and integrates the estimation of grid-point values and the numerical integrations in one process. The grid consists of 100 radial stations and the resulting resolution near the centre is approximately 2 m (!) for a model with R = 10 km, and approximately 10 m for R = 50 km, etc. Therefore resolution is limited in practice only by the accuracy and density of the contour data from the topographical maps.

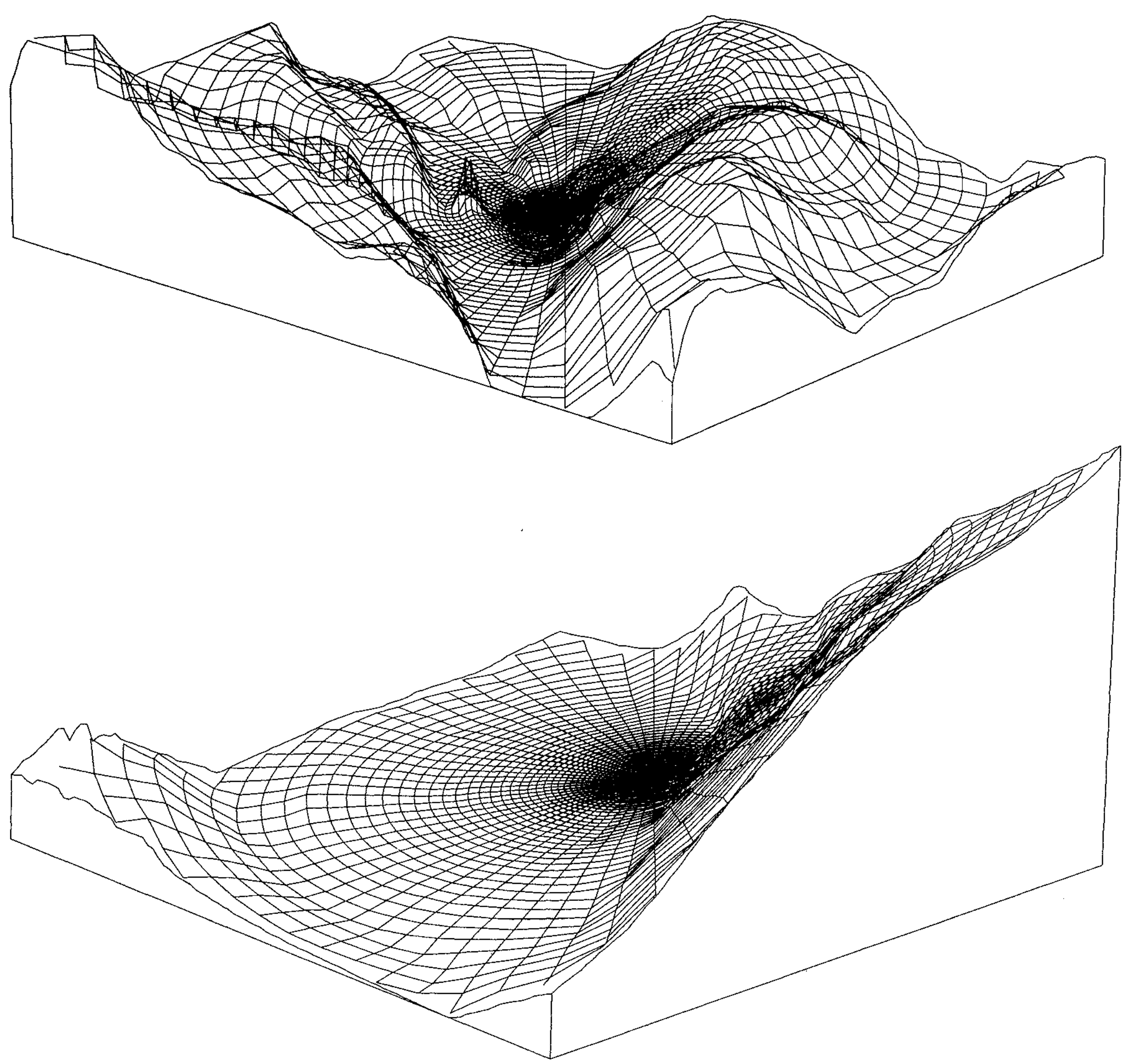


Figure 8.2: The polar zooming grid employed by the model for the calculation of flow in complex terrain. Part of the Great Glenn Valley in Scotland is seen from a point above Loch Ness. The grid is superimposed on the terrain and centered on the meteorological station Fort Augustus. The side length of the upper figure is 12 km and the lower figure shows a smaller part with a side length of 2 km. The vertical scale is exaggerated by a factor of 5.

8.6 The statistical basis

Basic concepts

Observation or measurement of wind at any location reveals that both speed and direction are rapidly varying in time, as illustrated in Fig. 8.3. Wind speed measured continuously over 100 days is shown on the first graph, followed by graphs which in sequence zoom in on smaller and smaller parts of the series. It is easy to see the much larger relative variance in the longer time series, as compared with the time series covering hours or less. This partitioning of the variance on different time scales is further illustrated by the power spectrum in Fig. 8.4.

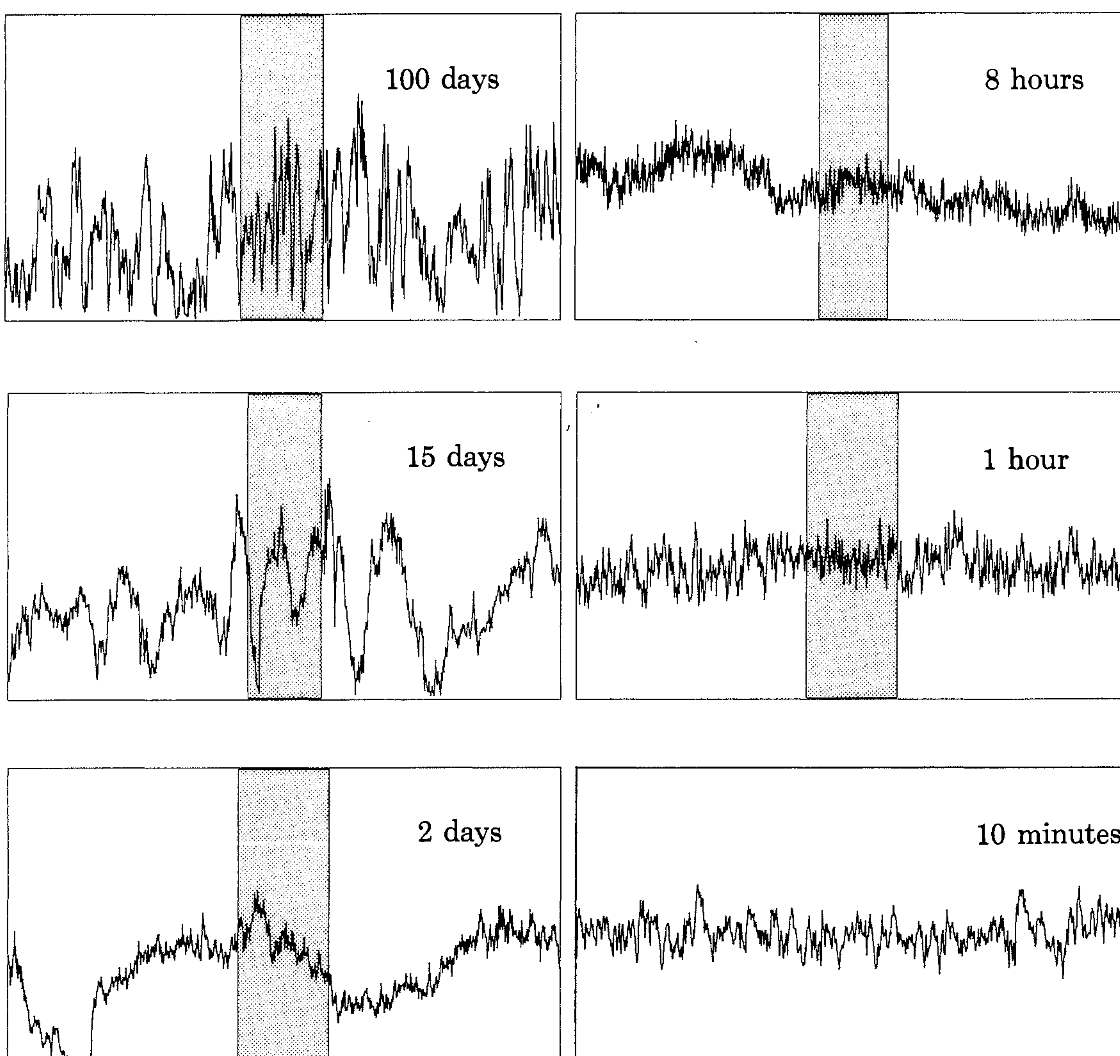


Figure 8.3: Wind speed measured 30 m above flat homogeneous terrain in Denmark (Courtney, 1988). Each graph shows the measured wind speed over the time period indicated. The number of data points in each graph is 1200, each data point corresponding to the speed averaged over 1/1200 of the period. Vertical axis is wind speed, 0-20 $m\,s^{-1}$.

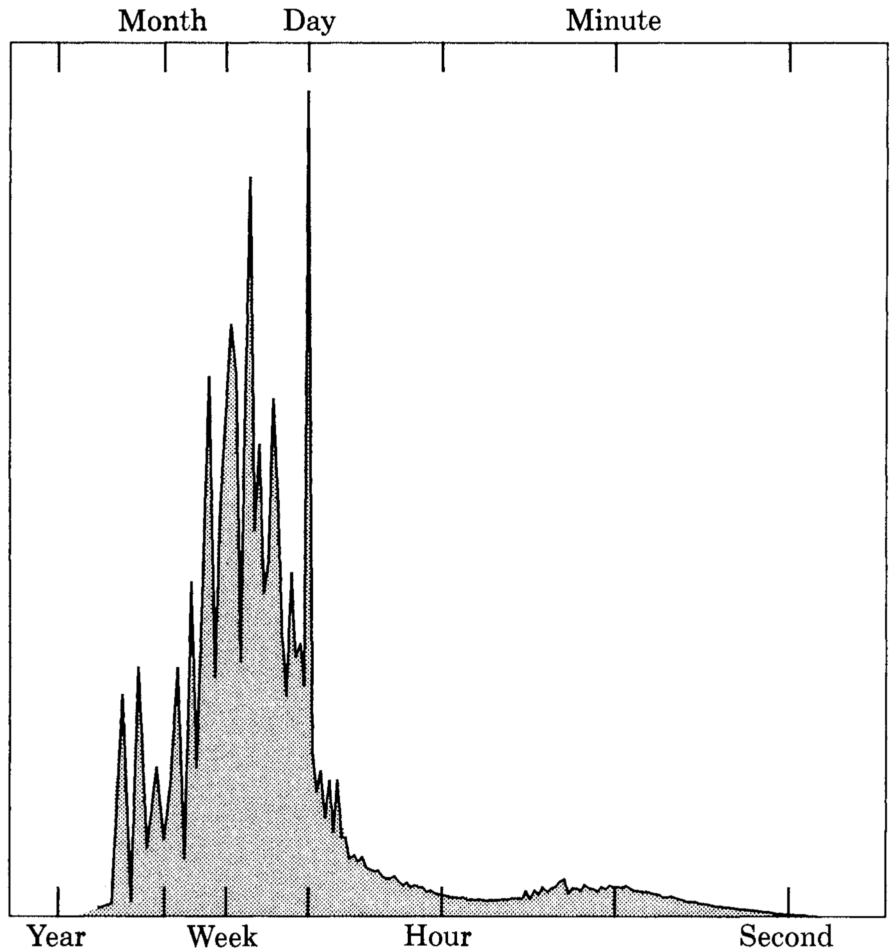


Figure 8.4: The power spectrum of wind speeds measured continuously over a flat homogeneous terrain in Denmark (Courtney, 1988). The data were collected over one year with a sampling frequency of 8 Hz. The spectrum is shown in a log-linear, area-true representation.

The mechanisms that cause the wind to blow are in contrast changing only slowly with time - as the weather changes. In addition to the rapid change at a single point, speed and direction change from point to point at any given instant. The reason for the variations of the wind is the turbulence in the atmospheric boundary layer. In order to define in a meaningful way a measured wind speed it must be referred to an averaging period T. Ideally, measurements should be taken with a fast-responding instrument and the average formed by integration:

$$\overline{u} = \frac{1}{T}\int_0^T u(t)\,dt \tag{8.33}$$

where the mean value of u is indicated by an overbar (this notation is used in this section of the Atlas only, for the sake of clarity).

In practice, due to differences in instrumental setup, data reduction and reporting, averaging periods range from a few minutes to hours. The data used for the Atlas correspond mostly to an averaging time of 10 minutes or 1 hour. Each observation in these data sets thus gives one value of $\overline{u}$ and the bulk of this book deals with the statistics of these averages, mainly in the form of tables of frequency of occurrence and Weibull distributions as discussed in the following section.

The data contain no information about wind fluctuations over periods much shorter than the averaging time T. These faster turbulent fluctuations do however contribute to the theoretical wind power density and consequently they must be taken into account when the data are applied to the estimation of wind power potential. The wind power density available over a time interval T is given by:

$$\overline{E} = \overline{\frac{1}{2}\rho u^3} = \frac{1}{2} \cdot \frac{1}{T} \int_0^T \rho u^3(t)\, dt \tag{8.34}$$

In this equation the air density may be taken as a constant with an error of less than a few per cent. Hence Eq. 8.34 becomes:

$$\overline{E} = \frac{1}{2}\rho\overline{u^3} \tag{8.35}$$

The instantaneous wind speed can be written as the average value plus a deviation from the average:

$$u = \overline{u} + u' \tag{8.36}$$

Straightforward operations give:

$$\begin{aligned} \overline{u'} &= 0 \\ \overline{u'^2} &= \overline{u^2} - \overline{u}^2 \\ \overline{u^3} &= \overline{u}^3 + \overline{u'^3} + 3\overline{u'^2}\,\overline{u} \end{aligned} \tag{8.37}$$

Denoting the magnitude of the rms-value of the turbulent fluctuations σ_u and the turbulence intensity i one may write:

$$\begin{aligned} {\sigma_u}^2 &\equiv \overline{u'^2} \\ i &\equiv \frac{\sigma_u}{\overline{u}} \\ \overline{E} &\simeq \frac{1}{2}\rho\overline{u}^3(1 + 3i^2) \end{aligned} \tag{8.38}$$

The frequency distribution of $\overline{u}$ determines $\overline{E}$ except for the correction term $3i^2$. Turbulence intensity depends on surface conditions and height. For homogeneous surface roughness and neutral conditions a simple relation is found:

$$i = \frac{1}{\ln(z/z_0)} \tag{8.39}$$

The correction term in Eq. 8.38 will typically amount to a few per cent (6% for z = 30 m and z_0 = 0.03 m).

It is important to note, however, that this result applies to the power density at a single point, and that the extraction of this power by a wind turbine involves the effect of simultaneous winds over the entire rotor disk, as discussed in Section 6.1. The present study does not include a more detailed evaluation of the effect of the turbulent fluctuations on the power production by a wind turbine, nor will other aspects depending on details of the turbine design be discussed here.

The Weibull distribution

The presentation of wind data makes use of the Weibull distribution (Weibull, 1951) as a tool to represent the frequency distribution of wind speed in a compact form. The two-parameter Weibull distribution is expressed mathematically as:

$$f(u) = \frac{k}{A}\left(\frac{u}{A}\right)^{k-1} \exp\left(-\left(\frac{u}{A}\right)^{k}\right) \tag{8.40}$$

where $f(u)$ is the frequency of occurrence of wind speed u (as elsewhere in the Atlas, except in the previous section, the indication of mean value $\overline{u}$ is not shown explicitly). The two Weibull parameters thus defined are usually referred to as the scale parameter A and the shape parameter k. The influence on the shape of $f(u)$ for different values of the shape parameter is illustrated in Fig. 8.5. For $k > 1$ the maximum (modal value) lies at values $u > 0$, while the function decreases monotonically for $0 < \mathrm{k} \leq 1$.

The Weibull distribution can degenerate into two special distributions, namely for k = 1 the exponential distribution and for k = 2 the Rayleigh distribution. Since observed wind data exhibit frequency distributions which are often well described by the Rayleigh distribution, this one-parameter distribution is sometimes used to represent wind data; here, however, the more general two-parameter Weibull distribution is used throughout. Inspection of the k-parameter for individual stations in the Atlas shows that, especially for Northern European climates, the values are indeed generally close to 2.0.

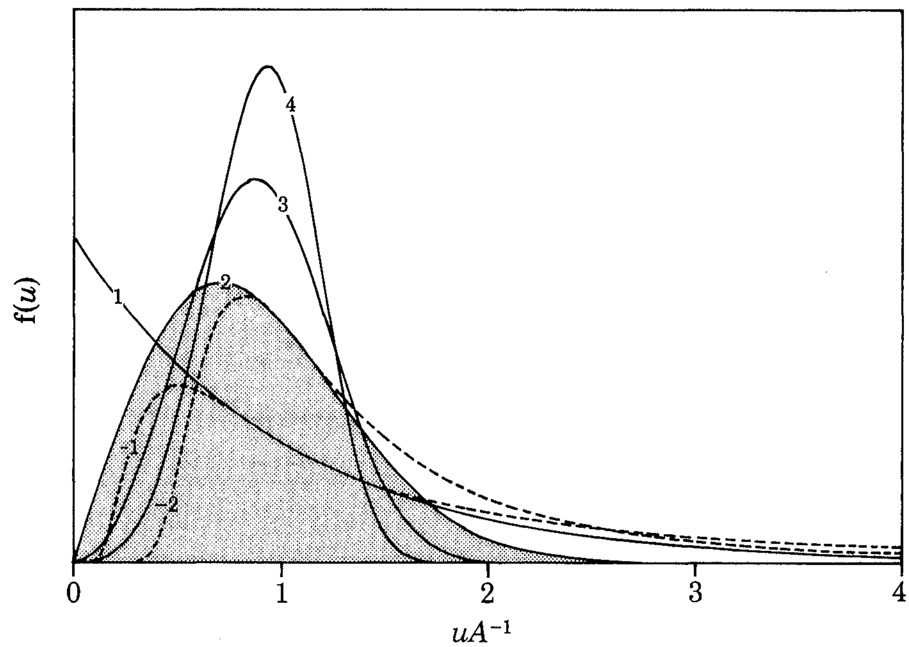


Figure 8.5: The shape of the Weibull distribution for different values of the shape parameter k.

The cumulative Weibull distribution $F(u)$ gives the probability of the wind speed exceeding the value u and is given by the simple expression

$$F(u) = \exp\left(-\left(\frac{u}{A}\right)^k\right) \tag{8.41}$$

The Weibull distribution generates Weibull-distributed higher powers: if u is Weibull-distributed with parameters A and k, then u^m is Weibull-distributed with the parameters A^m and k/m.

Moments and other important characteristics of Weibull distributions are easy to derive; a list of the more common characteristics is given here for reference:

$$\begin{aligned}
&\text{mean value: } A\Gamma(1+\tfrac{1}{k})\\
&\text{mean square: } A^2\,\Gamma(1+\tfrac{2}{k})\\
&\text{mean cube: } A^3\Gamma(1+\tfrac{3}{k})\\
&\text{mean } m\text{th power: } A^m\Gamma(1+\tfrac{m}{k})\\
&\text{variance: } A^2\,[\Gamma(1+\tfrac{2}{k})-\Gamma^2(1+\tfrac{1}{k})]\\
&\text{modal value: } A(\tfrac{k-1}{k})^{1/k}\\
&\text{median: } A(\ln 2)^{1/k}
\end{aligned} \tag{8.42}$$

The available wind power density is proportional to the mean cube of the wind speed:

$$E = \frac{1}{2}\rho A^3\Gamma\left(1+\frac{3}{k}\right) \tag{8.43}$$

where E is power density (Wm^{-2}), ρ is air density ($\sim$ 1.2 kg m^{-3} for a temperature of 15°C and a standard pressure of 1013 mb).

The wind speeds at which the highest power density is available is given by:

$$u_m = A\left(\frac{k+2}{k}\right)^{1/k} \tag{8.44}$$

Thus, for a Rayleigh distribution, the wind speed which contains the highest energy on the average is twice the most frequent speed (modal value).

Many different methods can be used for the fitting of the two Weibull parameters to a histogram giving the frequency of occurrence of wind speed in a number of intervals (bins). If the observed data are well represented by the Weibull distribution over the whole range of speeds, then the fitting procedure can be chosen at will. In general, however, observed histograms will show deviations due to a number of causes, and a fitting procedure must be selected which focuses on the wind speed range relevant to the application. Here the emphasis is on the higher wind speeds and a moment fitting method is used which focuses on the higher but not the extreme wind speeds.

For each azimuthal sector, the two Weibull parameters are determined by the requirements that: 1) the total wind energy in the fitted Weibull distribution and the observed distribution are equal, and 2) the frequencies of occurrence of wind speeds higher than the observed average speed are the same for both distributions. The combination of these two requirements leads to an equation in k only, which is solved by a standard root-finding algorithm.

Most difficulties in fitting to observed data are related to the treatment of very low and very high wind speeds. The highest wind speeds, say the uppermost percentile of observations, are statistically very uncertain and special methods (i.e. Gumbel, 1958) must be employed in extreme wind analysis. This analysis is not included in the Atlas, and the Weibull distributions given here should not be used for the estimation of frequencies of occurrence much below 0.01.

At low wind speeds, limitations in instrument response, reporting practices and data truncation can lead to substantial errors in the frequency of occurrence. Sometimes such errors give rise to an abnormally high frequency of recorded calms. For wind power applications, the precise form of the frequency curve for wind speeds lower than the average is of little concern and the present fitting method is designed with this in mind. It should be noted, however, that for meteorological stations with mean speeds of $\sim$ 3 m s^{-1} or lower, located in a reasonably windy climate, but locally heavily sheltered, the calculated regional wind climate from such stations becomes inaccurate because of these difficulties. In addition, the physical models used in the analysis are deficient at low wind speeds.

The fitting method described above is used to estimate the Weibull parameters for each of the observed azimuth sectors and for the sectorwise fitting of model-derived (or transformed) frequency distributions. The parameters pertaining to the associated total or azimuth-independent wind distributions are obtained from the sectorwise distributions fitting to the sums of the first and third moments.

8.7 The Wind Atlas analysis model

The model is composed of the submodels described in the preceding sections. By means of measured wind data, descriptions of local terrain roughness, sheltering obstacles and topographical height data, a regional wind climatology is calculated in the form of Weibull parameters pertaining to standard conditions. For each of the meteorological stations used in the Atlas, the input to the model is summarized on the left-hand pages and the model output is given on the right-hand pages in the station statistics (Chapter 7). A schematic representation of the analysis model is shown in Fig. 8.6.

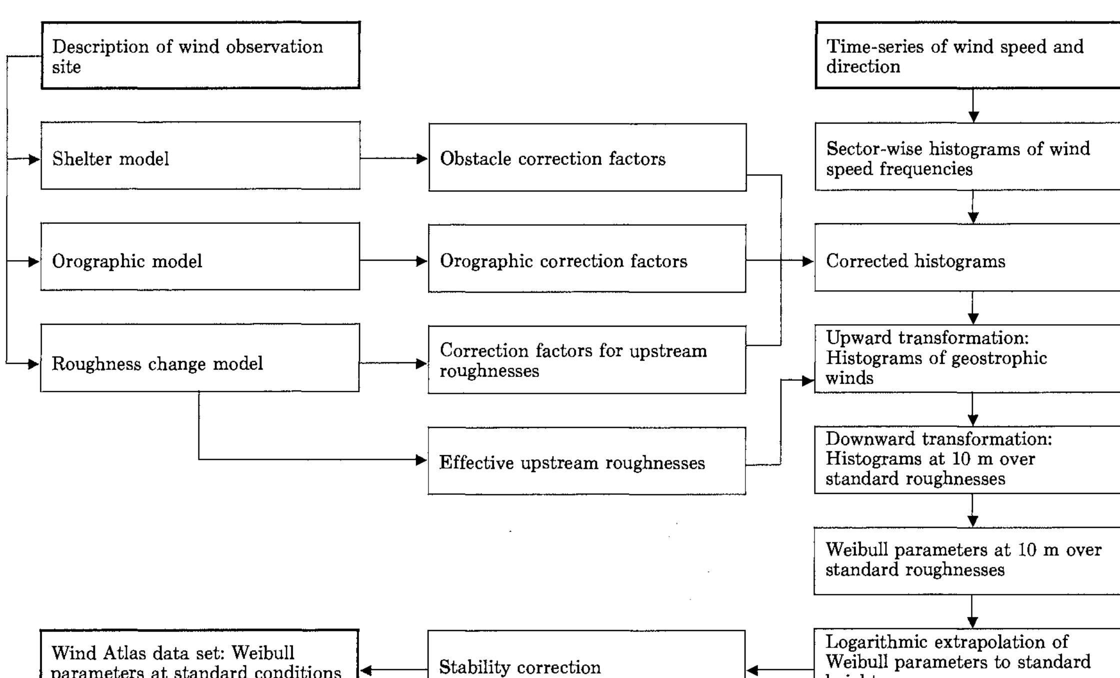


Figure 8.6: A schematic representation of the Wind Atlas analysis model.

The calculation procedure can be summarized as follows: input data are in the form of histograms for each of 12 azimuth sectors, giving the frequency of occurrence of wind speeds in bins of 1 $m\,s^{-1}$ width. First, wind speed-independent correction factors are calculated for each azimuth sector. Three sets of factors are considered:

- The obstacle correction factors, calculated using the shelter model, here denoted C^j_{obs} for the jth azimuth sector.
- The roughness change factors C^j_{rou}. The roughness change model relates the velocity at the station to the velocity upstream of the specified roughness changes. In addition, the area weighting of surface roughness gives an effective upstream surface roughness z^j_{0e}.
- The orography correction factors, calculated by application of the orographic model. The model is applied using as input a wind profile with direction in the centre of each sector. As described in Section 8.5 the actual surface roughnesses are taken into account as parameters in the orographic model. From this C^j_{oro} and D^j_{oro} are obtained, where D^j_{oro} is degrees of turning of the wind vector calculated by the orographic model.

Secondly, each combined azimuth and wind-speed bin is transformed using these factors. Considering the jth sector and the wind-speed bin from $u^{(k)}$ to $u^{(k+1)}$, application of the obstacle correction factor C^j_{obs} gives the corresponding values which would pertain if the obstacles were removed. Similarly, the orographic corrections and the roughness change corrections are applied to transform the bin boundaries to values for upstream conditions. For the turning of the azimuthal boundaries, the orographic turning angles are applied using the average of the two values nearest the boundary considered.

The effective surface roughness z^j_0 is used with each of the new bin boundaries in the geostrophic drag law, Eq. 8.5, to calculate the corresponding boundaries $G^{k,j}$ and $G^{k+1,j}$ with associated directions $D^{k,j}_{low}$ and $D^{k,j}_{high}$ from the low and high side of the original azimuth bin. In this transformation process the frequency of occurrence in the bin is conserved. The geostrophic wind could be used as a means of representation of the regional climatology, but the transformation process is instead continued to obtain the wind distributions over the standard values of surface roughness. Again using the geostrophic drag law, u_*-values for the standard surface roughness are obtained from the above $G^{k,j}$, $G^{k+1,j}$ and wind directions from the D-values above. From the logarithmic profile (Eq. 8.1) the corresponding values for the wind speeds at the lowest standard level (10 m) are obtained. At this stage the contributions to each of the "standard" azimuth (30°) and speed (1 $m\,s^{-1}$) bins are calculated. This procedure is repeated for each azimuth/speed bin in the input data and the result is four sets of histograms of the same form as the input histograms, but pertaining to the lowest standard level of 10 metres and to each of the four roughness classes. For each azimuth sector, the corresponding frequency of occurrence is extracted and the Weibull parameters are determined using the fitting procedure described in Section 8.6. The Weibull parameters corresponding to the higher standard levels z_n are then calculated as described in Section 8.1, using a modification of the logarithmic profile which takes into account the effects of the variation of surface heat flux. The average and root-mean-square heat fluxes are specified independently for over-land and over-sea conditions. The following values are adopted for all the analysed stations:

Average heat flux over land	=	-40 Wm^{-2}
Average heat flux over sea	=	15 Wm^{-2}
Root-mean-square heat flux over land	=	100 Wm^{-2}
Root-mean-square heat flux over sea	=	30 Wm^{-2}

Equations 8.17-8.18 give factors of "contamination" by the stability effects on mean values and standard deviations, respectively. These expressions are evaluated for contamination in the input data using the anemometer height, distance to the coast, and upstream equilibrium surface roughness in each azimuth sector. Similarly, the contamination is calculated for the different standard heights, and the ratios of these values to those on input are used to correct the Weibull parameters calculated using a logarithmic profile. The corresponding means and standard deviations are calculated using the expressions given in Eq. 8.42, the corrections are applied, and an inverse calculation is performed to determine the Weibull parameters corresponding to corrected values for means and variances. In this calculation, roughness class 0 refers to conditions over water and the three other roughness classes are corrected to conditions well inland beyond any coastal influence.

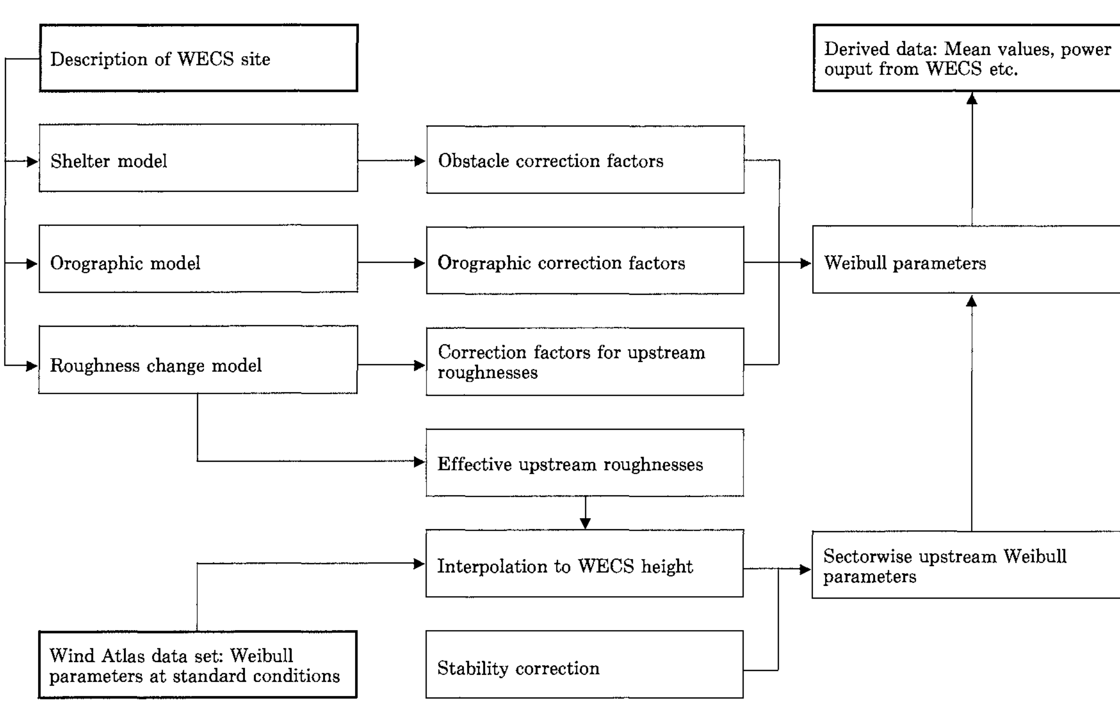


Figure 8.7: A schematic representation of the Wind Atlas application model.

8.8 The Wind Atlas application model

For the construction of the Atlas itself, the analysis model described in the preceding section is complete. Equally important, however, is the model built to enable an inverse calculation of site-specific wind speed distributions from the regional climatology. The model is shown schematically in Fig. 8.7. Such a model can be used to check the calculated regional statistics and can also be offered as a siting tool to the Wind Atlas user.

The model incorporated in WAsP is designed to be as close as possible to the inverse of the analysis model. The correction factors for local shelter, orography, and roughness changes are calculated exactly as in the analysis model, now of course using the obstacle list, roughness description, and orographic data pertaining to the site where the Atlas data are to be applied.

For the height considered, the Wind Atlas table is referenced and the appropriate Weibull parameters A_j and k_j for each azimuth sector are extracted in addition to the sector frequency f_j. For heights different from the standard heights and for surface roughnesses different from the standard values, a logarithmic interpolation is used. The surface roughness values used for each sector are the values calculated in the roughness change model z_{0e} (Section 8.3). The correction factors are applied to the A-parameter for each sector while keeping the k-parameter values at the table values. Finally, the stability correction is performed in the manner described above.

For a given height above the terrain and from a specification of terrain roughnesses, sheltering obstacles, and orographic details, the model therefore calculates values for the sector-wise Weibull parameters, and sector frequencies for a chosen regional climatology. Internal consistency is checked by calculating the station climatology using the regional climatology derived from the same station via the analysis model. Of more interest is the intercomparison using the regional climatology from one station to predict the local climatology of another nearby station. This intercomparison exercise is described in Chapter 9.

8.9 Meteorological data and station description

The network of meteorological stations used by the weather observation and warning services is usually called the synoptic network. The observation posts must necessarily be placed in areas where personnel are present the whole day for reasons other than weather monitoring; for example, at lighthouses. At airports meteorological measurements must be taken for aeronautical purposes, and these measurements are naturally included in the synoptic network. Most of the stations from which data have been used in the Atlas are, or have been, part of the synoptic network.

Long time-series of wind data are obtainable from synoptic stations, from stations established for the collection of climatic data and from other sources. For each of the countries the participant selected the stations from which data were subsequently acquired. In the selection a number of goals (Appendix C) were aimed at which can be summarized as follows:

- Sufficient coverage for each country: each climatic area should if possible supply data. For regions far from mountains this meant data from stations separated less than approximately two hundred kilometres. For mountainous areas this requirement could hardly anywhere be ideally fulfilled, and for such areas it was accepted that the analysis would supply spotwise results only.

- Sufficient time period. Climatic normals are traditionally referred to a 30-year period, but in this study it was necessary to limit the period covered to 10 years. The main reason for this was the importance attached to the reliable description of anemometric conditions and instrument accuracy.

- Well exposed anemometer, far from buildings and other obstacles. This requirement was probably the most difficult to satisfy.

- Accurate description of anemometric conditions and data of 10-min or hourly averages collected for each 3-hour period throughout the 24-hour day.

These requirements were in many cases contradictory and the station selection was done by the participant in each country based on his/her best judgement as to which was most satisfactory for the purpose of the Atlas, taking all the points into consideration.

The data were extracted from the archives of the meteorological and aviation services in the member countries. The participants supplied the data on magnetic tapes together with completed questionnaires as described in Appendix C.

The data were assumed to be quality-controlled by the supplying organization. The most important check after receipt of the data was an inspection of the frequency table, i.e. the raw statistics table given for each station in Chapter 7. By inspection, it was possible to detect data deficiencies such as:

- abnormally high wind speeds

- an abnormal number of observations in certain wind speed classes and/or wind direction sectors

- certain patterns in the table caused by the transformation of data originally reported in Beaufort, knots, miles per hour etc. to metres per second. The transformation of data measured in for example 16 sectors to 12 sectors may also cause a pattern in the table.

The cure for these data deficiencies was quite simple. The abnormally high wind speeds were manually removed. Only very few data points were excluded by this procedure. Abnormal occurrences of wind speeds and directions were checked against known climatology. The patterns caused by data transformation were eliminated by the following procedure: if the discretization of the wind speed u and direction D is given by Δu and ΔD, then a new value is assigned for each observation:

$$\begin{aligned} u_{new} &= u_{old} + a\,\Delta u \\ D_{new} &= D_{old} + b\,\Delta D \end{aligned} \tag{8.45}$$

where a and b are uniformly randomly distributed over the interval [−0.5, +0.5].

Another data problem which had to be dealt with was the lack of night-time observations at some stations. Most of the stations used in the study have observations for every three hours as required in the selection criteria for wind-observation sites mentioned above. But in certain areas it was unavoidable to include stations that lacked one or more night-time observations. The alternative of having no information at all for large regions was unacceptable.

Before such stations could be further analysed, it was necessary to fill in the missing data. The reason for this is that the minimum of the average diurnal cycle of wind speed occurs during night-time. Therefore the straightforward use of frequency tables generated from these data sets would have resulted in a bias toward higher mean wind speeds.

The procedure chosen replaces the missing data by linearly interpolating over the time interval between the last night and the first morning observation. This procedure was applied to frequency tables generated for each of the eight 3-hourly observational periods. Frequency tables for the missing observational periods were substituted with tables linearly interpolated between the available periods.

The stations with the problem of no night-time observations can be recognized from the wind climatological fingerprint and the table of means in the station description because the averages are missing for certain hours.

The information on the topography surrounding the stations, provided together with the data, was converted into numbers which could be used as input to the roughness, shelter, and orography model.

The roughness classification mainly followed the procedure given in Section 5.2, employing the model described in Section 8.3. The roughness was determined by the use of maps on scales of 1:25 000 or 1:50 000, from photos taken at the place of observation, and aerial photos from some stations. For military reasons, photos or maps could not be provided for some stations; in such cases the participant in question extracted the information as completely as possible.

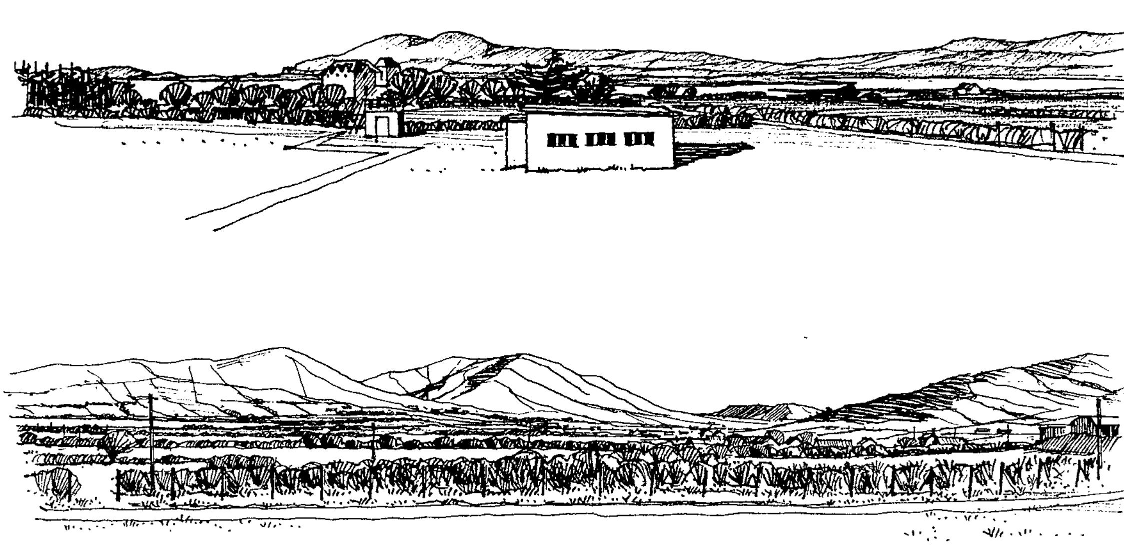
For each station, the horizon was divided into twelve 30°-sectors, and the assignment of surface roughness lengths was performed sector by sector. The classification extended to at least 5 km from the station. If an extensive water surface or other significant changes in terrain occurred farther away, the classification was extended to 10 km or more. The results of the roughness assignment are given for each station in the station statistics.

Information on obstacles close to the anemometer site that might have influenced the measurements was either provided by the participants as a completed "obstacle description form" for each station, or it was extracted from maps, photos, and other descriptions.

Reverting to the problem of using measurements obtained either near to or on top of buildings, it is obvious that the more the anemometer is influenced by the proximity of a building, the more difficult it becomes to extract regionally representative information from the data. From the start of the study an effort was made to avoid the problem by including only stations with anemometers on detached masts. In order to obtain a minimum data coverage however, it proved necessary to include stations having such problems. The problems are noted in the station descriptions in Chapter 7.

The data from a number of stations were judged to be influenced by orography, and the flow model described in Section 8.6 was applied to the data. Input for the model was obtained by digitizing the height contours from topographical maps.

Topographical maps on scales of 1:25 000 or 1:100 000 were used as a basis. Near the meteorological stations contour lines were digitized as finely as possible, using a standard digitizer. In some cases enlargements were made to facilitate the tracing of nearby contours.



Views from the Valentia Observatory, Ireland

Radiosonde statistics

In addition to statistics for wind data measured near the surface, the Wind Atlas gives statistics from 29 radiosonde stations. The radiosonde systems which are used for obtaining the data vary from country to country. As an example, a description is given below of the British radiosonde system, taken from "Meteorological Office: Upper-Air Summaries, 1961-70":

> The radar is used to track a passive reflector attached to the radiosonde balloon and the balloon position is determined in spherical polar co-ordinates (range, azimuth and elevation). Readings are taken at fixed time intervals of one minute using a time-scale common to the radar and radiosonde. The wind at a given standard level is measured by the horizontal displacement of the balloon in a 2 minute interval centred approximately on the given standard level; thus the observed wind is an average over a layer usually about 730 metres in thickness. The radiosonde ascents take place at 00 and 12 GMT.

The data presented in Table 7.3 pertain to 850 mb (except for the station at Heraklion, Greece), which for a station near sea level corresponds to a height of approximately 1500 metres. Thus, the data can be considered as representative of the geostrophic wind. This explains the value of including radiosonde data: the geostrophic wind is an important quantity in the Wind Atlas methodology, parts of which aim at calculating the geostrophic wind from surface data. The use of statistics of the geostrophic wind obtained either from radiosondes or from analysis of surface pressure fields to calculate regional wind climatology is described in Jensen et al. (1984) and Petersen et al. (1981). The regional climatologies calculated from the radiosonde data and presented in Chapter 7 are produced using the Wind Atlas analysis model described in Section 8.7 (the entry point is given in Figure 8.6 at the box labelled histograms of geostrophic winds).

For a number of reasons radiosonde statistics were not chosen as a primary source of data for this study. One reason is the lower density of upper-air stations as compared with surface stations, another reason is the difficulty of obtaining data in unified form and quality. The application of radiosonde data has therefore not been fully explored. However, a preliminary comparison of predictions from radiosonde data and surface data suggests that for radiosonde data with a mean wind speed higher than approximately 10 $m\,s^{-1}$ the correspondence is good. For lower mean values the radiosonde data tend to give predictions of surface winds higher than observed.

The radiosonde statistics are supplemented by statistics for the surface geostrophic wind calculated for a position in Denmark by means of surface pressure measurements (Petersen et al., 1981).

8.10 Limitations of data and models

It is not possible to give strict error bounds for the data given in the Atlas, and the reliability of the Atlas is best assessed from data intercomparisons such as those presented in Chapter 9. To put these intercomparisons in some perspective a short discussion of uncertainties in the data and methods of analysis is given below.

Measurements are necessarily associated with uncertainties. The instrumentation is selected and the data handling is performed with a certain accuracy of the end product in mind. A good quality, carefully calibrated anemometer can measure with an accuracy of $\pm$ 2% when the wind speed is above 3 $\mathrm{m\,s^{-1}}$. However, this accuracy cannot be assumed for the synoptic and climatological data which forms the basic input to the Atlas. Excluding systematic errors, which may arise for various reasons such as a wrong calibration of the anemometer, an uncertainty of $\sim$ 5% for the wind speed data must be assumed. Some data sets may contain larger undetected errors, which may cause larger biases in the final results. This means that the estimation of the wind resource at the exact point where the wind is measured may be in error of $\sim$ 15% or more with respect to the mean power.

The transformation of data described in the preceding sections is a procedure for the calculation of wind statistics away from the points of measurement. Equally it can be considered a method to clean data from the influences of local terrain characteristics as explained above. In either case it is an extrapolation in the horizontal and vertical to a real nearby site or to an imaginary idealized location. Also the practical application of the Atlas involves an extrapolation in time from the past period covered by the measurements into the future.

In addition to errors and inaccuracies in the measured data, the transformation involves models, the specification of climatological parameters, and of parameters such as surface roughness to each measuring station, and as a consequence uncertainties will accumulate.

The submodels described above are each based on simplifying assumptions, necessary in order to make the analysis tractable. The geostrophic drag law (Eq. 8.5), which can be considered the central hub around which the models are built, is strictly applicable only under an idealized and limited range of conditions. Application of the drag law to calculate the geostrophic wind speed from an individual surface wind observation is associated with an uncertainty $\pm$15% or more. This uncertainty is mainly caused by instationarity and baroclinicity (Clarke and Hess, 1974). In the present context of relating the wind frequency distributions at conditions of different surface roughnesses, much smaller deviations are found in practice. This is illustrated by the results of the station intercomparisons in Chapter 9, in particular for stations not situated in mountainous terrain.

For the shelter model described in Section 8.4 the basic uncertainties can be estimated from the data of Perera (1981). Additional uncertainty is introduced in the model by the application to three-dimensional real objects. In the calculations the typical effects from sheltering obstacles amount to a few per cent only and therefore even rather large relative errors in the shelter calculations have only a limited influence on the calculated statistics. If the shelter reduction factors are large the uncertainty attached to the derived statistics will be large.

The model for roughness change and the assignment of surface roughnesses introduce uncertainties which are largest at the higher end of the roughness scale. Estimation of surface roughness from topographic characteristics is only accurate to within a factor of 1.5 (approximately). This translates into expected errors of $\sim 5\%$ for mean speed values estimated from stations in generally open terrain ($z_0^{average} < 10$ cm) and up to $\sim 15\%$ for very closed terrain ($z_0^{average} > 40$ cm).

For very sheltered locations there is the added difficulty that the measured data are often biased towards too low mean values due to the relatively high threshold of most wind speed measuring instruments.

The largest expected errors in the Atlas are related to the calculation of flow in complex orography. Empirically, the orographic model is found to work well for the prediction of flow perturbations over not too steep hills and ridges. The model-induced typical error is of the order of 10% in estimates of relative increase of wind speed on top of a hill which has horizontal dimensions of less than 1-2 km and slopes less than 30%. For steeper hills and ridges the model will underpredict the degree of speed reduction in the lee of the hill as will other similar models (see e.g. Salmon et al., 1987). This effect becomes quite pronounced for steep hills where the flow behind the hills separates.

Larger scale orographic features render the model increasingly deficient because of the importance of the dynamics not present in the model. It is difficult to estimate the magnitude of typical errors, but some relief is given in the present application, where the model setup ensures that for estimation of wind conditions close to the point of measurement results will be only marginally influenced by the details of flow on larger scales.

The basic data used in the Atlas pertain to low heights, usually 10 m. For heights above 50 m, the climate of the surface heat flux becomes an increasingly important parameter for the vertical extrapolation of wind distributions. For this reason, a general decrease of the reliability of the Atlas should be expected for the prediction of winds at greater heights. The comparisons with data from high masts in Chapter 9 are to some extent contradictory to this expectation, but this test of the stability model cannot be considered conclusive due to the limited data sets available.

Chapter 9

Verification of the Wind Atlas methodology

A judgement as to whether the regional statistics calculated by means of a particular station are in fact adequate for the determination of wind speed distributions with sufficient accuracy for wind energy estimates in the region around the station has to be based on comparisons between predictions and measurements. A partial verification is attempted in the following intercomparisons between stations which are mainly situated in the same basic wind climatological conditions, as given by the maps in Chapter 2, and are separated by a distance of approximately 200 km or less.

9.1 Station intercomparisons

As an example, the regional statistics from the Irish Atlantic coast station Belmullet are used to predict the mean wind speed at the measuring site of the station Valentia also situated on the Atlantic coast. The procedure was described in Fig. 1.1. The input to the calculation procedure (the Wind Atlas application part of WA^{S}P) is the regional statistics from Belmullet (the predictor), and for Valentia (the predicted station) the necessary information is the roughness rose, the shelter information and a digitized map in the form of height contour lines.

The results of the calculations are shown below in *score schemes* where the names of the predicted stations are printed in full and the predicting stations are indicated by three-letter abbreviations. The diagonal line of bold face figures indicates the stations predicting themselves; except for round-off errors, this results in mean values equal to those actually measured. Hence the bold face figures are those for comparing predictions. For example, as shown in Table 9.2, the station Shannon is predicted by the stations Claremorris, Roches Point and Cork to have a mean value of 4.9, 4.9, and 5.2 m s^{-1} respectively, which should be compared with a measured mean value of 5.0 m s^{-1}. The score scheme for the Irish stations provides a very convincing intercomparison within the three groups of stations: The Atlantic coast stations, the South coast stations and the inland stations. It is however clear from some of the other score schemes that this is not always the case.

In the preceding chapter the uncertainties inherent in the Wind Atlas methodology were discussed, such as for example measuring errors and the inability of the physical models to model real flow conditions. The collective effect of the various uncertainties is to diminish the reliability of the regional statistics and hence their application for predicting wind statistics at sites in the regions. Apart from these uncertainties there is the fundamental problem of determining the flow in hilly and mountainous terrain. It is obvious that a station located in a deep valley experiences a wind that has been subject to a considerable channelling effect; an example is the UK station Fort Augustus. Stations which are influenced by such strong orographic effects can only be used as predictors for sites in the vicinity, subject to the same terrain conditions.

In the selection of stations for the score schemes it has in general been difficult to find stations in complicated terrain which can be expected to be exposed to and reflect the same orographic influence. Despite the problems with the application of stations in hilly and mountainous terrain, several such stations have been included in the score schemes to show the uncertainties involved. Each score scheme is accompanied by a short comment - for a further investigation of the discrepancies in the predictions the reader is referred to the station descriptions in Chapter 7.

There are two distinct types of systematic deviations which can be attributed to measuring errors and/or errors occurring during the extraction of input data for the models from the station information (photos, maps, written descriptions etc). The first type is characteristic of a station which is predicted too low, whereas the station itself predicts the other stations too high. This can be caused by:

- The wind speed measuring instrument reading too high (probably a calibration problem)

- The roughnesses in the roughness rose being too high

- The effect of nearby sheltering obstacles being exaggerated

- The calculated effect of the orography underestimating the overspeeding.

The second type is characteristic of a station which is predicted too high whereas the station itself predicts the other stations too low. This can be caused by the same effects as described above, but with opposite signs.

The comparisons give a first indication of the regional representativeness of the statistics from a station or a group of stations. The intercomparisons should be taken with a grain of salt: many stations have almost the same mean value between 4 and 5 $\mathrm{m\,s^{-1}}$ and some of the predictions might look like random scatter in this interval. However, faith is restored when large differences between stations are well predicted, for example, the Dutch stations Eelde and Texel lightship predict each other almost exactly with mean values of 4.5 and 7.6 $\mathrm{m\,s^{-1}}$, respectively. At the extreme, the two UK stations Snaefell at the highest point of the Isle of Man (621 m) and Blackpool at the coast of the Irish Sea with mean values of 13.8 and 5.7 m s^{-1} predict each other with 12.0 and 7.1 m s^{-1} respectively. This is satisfactory when it is considered that the calculations include orographic enhancement of the wind speeds at Snaefell of up to 144%.

More complete intercomparisons within a group of stations require predictions at various heights and an investigation of the predicted windrose, the latter being the Weibull parameters and frequency of occurrence as a function of wind direction. Even a rudimentary presentation of such predictions would inflate the format of the Atlas, but a few comparisons of measured and predicted data for different levels of high masts are presented in Section 9.2. It is possible for the reader to perform windrose intercomparisons between stations which are not influenced by orography by means of the methods described in Chapter 5. More complete intercomparisons including stations in mountainous terrain can be performed using the WA^{S}P program. An example is given in Table 9.1.

Table 9.1: Prediction of wind conditions at a station in complex terrain using radiosonde statistics. The regional Wind Atlas statistics from the radiosonde station at Stornoway, UK, are used to predict the sectorwise and total Weibull parameters for Fort Augustus, UK, see also Fig. 8.2. The comparison demonstrates the possible use of upper-air data for the evaluation of wind conditions in complex terrain. The comparison between the measured and predicted data shows good agreement and this is in part due to the windiness of the region.

Sector	Measured			Predicted			Measured		
	Stornoway			Fort Augustus			Fort Augustus		
°	A	k	f	A	k	f	A	k	f
0	10.7	1.85	6.5	1.9	1.48	3.6	1.9	1.12	4.3
30	10.2	1.94	4.7	2.8	1.56	5.2	3.6	1.73	7.8
60	9.2	1.77	4.1	3.5	1.50	9.6	3.8	1.94	10.0
90	9.3	1.68	4.0	2.3	1.33	4.8	2.5	1.44	4.6
120	9.3	1.64	5.2	1.9	1.56	4.2	1.2	0.79	3.1
150	9.2	1.64	5.7	1.8	1.77	5.0	1.8	0.94	3.3
180	12.7	1.90	9.7	3.1	1.51	7.8	3.5	1.40	5.3
210	15.4	1.94	13.7	4.9	1.85	17.1	5.5	2.43	21.3
240	16.3	2.21	15.7	5.5	1.93	27.2	4.7	1.89	25.1
270	15.5	2.07	13.6	3.1	1.47	7.2	2.6	1.52	9.0
300	13.5	1.92	9.2	2.2	1.60	4.7	1.0	0.87	3.3
330	11.7	1.89	8.0	1.5	1.70	3.3	0.9	0.83	3.0
Total	13.1	1.81	100.0	3.7	1.42	100.0	3.9	1.65	100.0

Table 9.2: Comparison of Irish stations. Three groupings of stations appear: Atlantic coast stations (Valentia, Belmullet and Malin Head), south coast stations (Cork, Roches Point) and inland stations (Shannon, Claremorris and Mullingar). The agreement within these groups is very good. Furthermore, if the last two groups and Dublin are considered as one group, here also the agreement is good. Dublin is considered to be representative of the non-mountainous Irish Sea coast and it is compared with some UK stations in Table 9.3.

	Bel	Val	Mal	Sha	Cla	Roc	Cor	Mul	Dub
Belmullet	**6.9**	6.8	6.9	5.8	5.6	5.7	5.9	5.8	6.0
Valentia	5.9	**5.7**	5.8	4.9	4.8	4.9	5.1	4.9	5.2
Malin Head	8.5	8.3	**8.2**	7.1	6.9	7.2	7.4	7.1	7.4
Shannon	5.9	5.9	6.0	**5.0**	4.9	4.9	5.2	5.0	5.2
Claremorris	5.3	5.2	5.2	4.4	**4.3**	4.4	4.5	4.4	4.6
Roches Point	7.7	7.8	7.9	6.7	6.4	**6.4**	6.9	6.5	6.7
Cork	6.0	5.9	5.9	5.0	4.9	5.0	**5.1**	5.0	5.3
Mullingar	5.8	5.8	5.8	4.9	4.7	4.8	5.1	**4.9**	5.1
Dublin	5.9	5.8	5.9	5.0	4.8	4.9	5.1	4.9	**5.2**

Table 9.3: Comparison of seven UK and one Irish station. The first group includes stations close to the Irish Sea: Dublin, Snaefell, Valley and Blackpool. The stations compare well even for Snaefell, taking into consideration its location on a 621-m high summit on the Isle of Man. The stations Manchester, Bala, Lowther Hill and Eskedalemuir represent inland conditions, the three latter being situated in very rugged mountainous terrain with many summits. Manchester is further considered in Table 9.5.

	Dub	Val	Bla	Sna	Bal	Man	Low	Esk
Dublin	**5.2**	4.9	5.2	6.2	5.2	4.6	5.3	5.5
Valley	7.4	**7.0**	7.1	8.8	7.5	6.5	7.4	7.8
Blackpool	6.0	5.6	**5.7**	7.1	6.0	5.2	6.0	6.3
Snaefell	11.6	11.0	12.0	**13.8**	11.4	10.5	12.0	12.0
Bala	4.1	3.6	3.9	4.8	**4.0**	3.4	3.9	4.3
Manchester	5.0	4.9	5.0	6.1	5.2	**4.5**	5.2	5.5
Lowther Hill	10.1	9.4	10.1	11.9	9.9	8.9	**10.1**	10.5
Eskdalemuir	4.5	4.4	4.5	5.4	4.6	4.1	4.7	**4.9**

Table 9.4: Comparison of six stations in Scotland, UK, of which four are coast stations (Benbecula, Duirinish, Dustaffnage and Wick) and two are in the mountains: Cairngorm on a 1065-m high summit and Fort Augustus in the deep Glen Valley. Duirinish and Dustaffnage are both situated in the same wind conditions at the west coast of Scotland and they compare well. Wick, located at the nothernmost point of Scotland, compares reasonably well with the two mountain stations, whereas Benbecula on the west coast of the Outer Hebrides compares less well. The two mountainous stations are shown merely for the purpose of illustration, however Fort Augustus compares surprisingly well with the coastal stations.

	Ben	Dui	Dus	Wic	Cai	For
Benbecula	**6.8**	5.5	5.7	5.8	6.9	6.8
Duirinish	7.5	**6.0**	6.2	6.4	7.8	7.4
Dustaffnage	6.1	4.9	**5.2**	5.3	6.1	5.9
Wick	6.8	5.5	5.8	**5.9**	6.8	6.6
Cairngorm	9.8	7.8	8.5	8.6	**9.9**	9.5
Fort Augustus	3.5	3.0	3.0	2.9	3.8	**3.4**

Table 9.5: Comparison of nine UK stations covering central and South England. The stations can be grouped as follows: central England with Manchester, Birmingham and London; South-West England with Burrington, Exeter, Bournemouth and Yeovilton; Central-East England with Waddington and Coltishall. Within the three groups the stations compare reasonably well.

	Man	Bir	Wad	Col	Lon	Bou	Yeo	Exe	Bur
Manchester	**4.5**	4.6	4.9	4.5	4.0	4.1	4.7	4.5	5.1
Birmingham	4.5	**4.5**	4.8	4.5	4.0	4.0	4.7	4.5	5.2
Waddington	4.6	4.6	**5.0**	4.6	4.1	4.1	4.8	4.6	5.2
Coltishall	4.6	4.7	5.1	**4.7**	4.2	4.2	4.9	4.6	5.3
London	4.4	4.5	4.9	4.5	**4.0**	4.1	4.7	4.4	5.1
Bournemouth	4.7	4.8	5.1	4.7	4.2	**4.3**	4.9	4.7	5.4
Yeovilton	4.6	4.7	5.1	4.7	4.1	4.2	**4.8**	4.6	5.1
Exeter	4.5	4.6	4.9	4.6	4.1	4.1	4.8	**4.6**	5.3
Burrington	5.1	5.1	5.5	5.1	4.5	4.6	5.3	5.1	**5.8**

Table 9.6: Comparison of nine Danish stations. Three groups of stations can be identified: Mid-West to North-West Jylland with Ålborg and Karup; the rest of Jylland with Horns Rev Fyrskib, Tirstrup and Skrydstrup; the islands with Beldringe on Fyn, Kastrup on Sjælland and Rønne on Bornholm. Within these groups the agreements are good. Even when all the stations are considered as belonging to the same group – as is the case in the Danish Wind Atlas - the comparisons are rather good.

	Ålb	Kar	Hor	Tir	Skr	Bel	Vær	Kas	Røn
Ålborg	**5.8**	6.2	5.4	5.8	5.6	5.4	4.9	5.9	5.3
Karup	5.0	**5.3**	4.6	4.9	4.8	4.5	4.2	5.0	4.5
Horns Rev Fyrskib	8.4	8.9	**7.8**	8.3	8.0	7.7	7.2	8.4	7.6
Tirstrup	4.5	4.7	4.2	**4.3**	4.3	4.0	3.8	4.5	4.2
Skrydstrup	4.8	5.2	4.5	4.8	**4.6**	4.4	4.1	4.8	4.4
Beldringe	5.5	5.8	5.1	5.4	5.3	**4.9**	4.6	5.5	4.9
Værløse	5.3	5.6	4.9	5.2	5.1	4.8	**4.5**	5.3	4.8
Kastrup	6.3	6.6	5.8	6.1	5.9	5.7	5.3	**6.3**	5.7
Rønne	6.5	7.0	6.0	6.5	6.2	6.1	5.5	6.5	**5.8**

Table 9.7: Comparison of six German and one Dutch station. The stations Bremen, Hamburg, Hannover, Braunschweig and Berlin are representative of inland North German conditions and compare well. Düsseldorf and Eindhoven do not agree, probably due to the influence of the Rhine valley on the wind climate at Düsseldorf.

	Bre	Ham	Han	Bra	Ber	Düs	Ein
Bremen	**4.3**	4.5	4.3	4.2	4.3	4.0	4.5
Hamburg	4.2	**4.3**	4.1	4.0	4.1	3.9	4.4
Hannover	4.1	4.3	**4.0**	4.0	4.1	3.9	4.4
Braunschweig	4.1	4.2	4.0	**3.8**	4.0	3.7	4.2
Berlin	4.2	4.3	4.2	4.0	**4.2**	3.9	4.4
Düsseldorf	4.4	4.5	4.3	4.2	4.3	**4.1**	4.6
Eindhoven	4.3	4.4	4.2	4.1	4.2	3.9	**4.4**

Table 9.8: Six German stations representing central and South German conditions are compared. Nürnberg, Weißenburg and München compare reasonably well, the rest much less so.

	Nür	Wei	Mün	Hof	Stu	Fra
Nürnberg	**2.8**	2.9	3.0	3.4	2.4	3.1
Weißenburg	2.6	**2.7**	2.9	3.3	2.3	3.1
München	3.1	3.3	**3.2**	3.8	2.6	3.5
Hof-Hohensaas	3.1	3.3	3.3	**3.8**	2.6	3.5
Stuttgart	3.1	3.1	3.2	3.7	**2.6**	3.3
Frankfurt	3.0	3.2	3.3	3.8	2.7	**3.4**

Table 9.9: Comparison of five North Sea stations and one land station: the two German islands Helgoland and List/Sylt, the Dutch island Terschelling, the two lightships Texel and Horns Rev and finally Skrydstrup Airport in southern Jylland. Except for Terschelling, the comparisons are rather good. It is seen that Skrydstrup, which has a much lower mean value than the rest of the stations is both well predicted and predicts well. The deviation of Terschelling is also seen in Table 9.10.

	Hel	Lis	Tex	Hor	Skr	Ter
Helgoland	**7.2**	7.5	7.1	7.3	7.5	7.7
List/Sylt	6.8	**7.0**	6.7	6.9	7.0	7.3
Texel Lichtschip	7.7	8.1	**7.6**	7.8	8.0	8.3
Horns Rev Fyrskib	7.7	8.1	7.6	**7.8**	8.0	8.3
Skrydstrup	4.4	4.7	4.4	4.5	**4.6**	4.8
Terschelling	7.1	7.5	6.9	7.2	7.4	**7.6**

Table 9.10: Comparison of six Dutch stations. Except for the station on the North Sea island of Terschelling the stations compare very well. The stations Schiphol, Leeuwarden and Eelde are representative of the near North Sea coast conditions and Eindhoven of inland conditions.

	Sch	Ein	Lee	Tex	Eel	Ter
Schiphol	**5.0**	4.7	5.2	5.1	5.1	5.5
Eindhoven	4.7	**4.4**	4.9	4.8	4.8	5.2
Leeuwarden	5.0	4.7	**5.1**	5.0	5.1	5.4
Texel Lichtschip	7.6	7.2	7.9	**7.6**	7.8	8.3
Eelde	4.4	4.2	4.6	4.5	**4.5**	4.9
Terschelling	6.9	6.6	7.2	6.9	7.1	**7.6**

Table 9.11: Comparison of Belgian, Dutch and Luxembourg stations. Five stations in Belgium (Middelkerke, Melsbroek, Florennes, Saint Hubert and Spa), Findel Airport in Luxembourg and Eindhoven in the Netherlands are compared. Middelkerke is situated 1200 metres from the North Sea coastline and does not compare well with the other stations which are representative of inland conditions. The inland stations compare well and Middelkerke is further considered in Table 9.12.

	Mel	Flo	Sai	Spa	Fin	Ein	Mid
Melsbroek	**4.4**	4.3	4.3	4.4	4.2	4.5	4.9
Florennes	4.0	**3.9**	3.9	4.1	3.8	4.1	4.5
Saint Hubert	4.5	4.3	**4.3**	4.4	4.2	4.6	5.1
Spa	4.1	4.0	4.0	**4.2**	3.8	4.2	4.6
Findel	4.1	3.9	3.9	4.1	**3.7**	4.1	4.5
Eindhoven	4.4	4.3	4.2	4.4	4.1	**4.4**	4.9
Middelkerke	5.2	5.0	5.0	5.2	4.8	5.3	**5.8**

Table 9.12: Eight stations in North-Western France and one Belgian station are compared. Two groups of stations can be identified: coast stations (Lorient, Brest, Dinard, Cherbourg and Middelkerke) and stations more than 10 km inland from the coast (Evreux, Caen, Abbeville and Cambrai). Apart from Cherbourg and Evreux the agreements within the groups are good. Evreux is further considered in Table 9.13.

	Lor	Bre	Din	Mid	Che	Evr	Cae	Abb	Cam
Lorient	**4.7**	4.8	4.5	4.7	5.3	3.8	4.2	4.1	4.2
Brest	4.5	**4.6**	4.4	4.4	5.0	3.6	4.0	3.9	3.9
Dinard	4.5	4.7	**4.4**	4.5	5.1	3.7	4.1	4.0	4.1
Middelkerke	5.9	6.0	5.6	**5.8**	6.5	4.8	5.3	5.1	5.2
Cherbourg	4.8	4.9	4.7	4.6	**5.3**	3.9	4.2	4.2	4.1
Evreux	5.1	5.2	5.0	5.0	5.6	**4.1**	4.6	4.4	4.6
Caen	5.3	5.4	5.1	5.2	5.9	4.3	**4.7**	4.6	4.7
Abbeville	5.4	5.5	5.2	5.3	6.0	4.3	4.8	**4.7**	4.7
Cambrai	5.4	5.5	5.2	5.3	6.0	4.4	4.8	4.7	**4.8**

Table 9.13: Five French stations, two German and one from Luxembourg are compared. The stations are representative of an area extending from Nantes in the south-west to Saarbrücken in the north-east. The stations compare well, with Toul showing the largest deviation.

	Nan	Evr	Orl	Rei	Tou	Saa	Fin	Fra
Nantes	**3.8**	3.8	3.8	3.7	3.5	3.7	3.9	3.4
Evreux	4.1	**4.1**	4.2	4.0	3.8	4.0	4.2	3.7
Orléans	4.2	4.2	**4.2**	4.0	3.8	4.1	4.3	3.7
Reims	3.9	3.9	3.9	**3.7**	3.5	3.8	4.0	3.4
Toul	3.8	3.7	3.8	3.6	**3.6**	3.8	3.8	3.5
Saarbrücken	3.5	3.5	3.6	3.5	3.3	**3.5**	3.6	3.2
Findel	3.7	3.7	3.7	3.5	3.4	3.6	**3.7**	3.3
Frankfurt	3.7	3.8	3.8	3.7	3.4	3.6	3.8	**3.4**

Table 9.14: Seven French stations in central and South-Western France are compared. The stations Poitiers, Limoges, Bordeaux, Avord and Toulouse compare reasonably well. Orléans, which can also be found in Table 9.13, and Mont de Marsan are not representative of the region. Mont de Marsan might be representative of the low wind region in the extreme south-west near the Pyrenées.

	Poi	Lim	Bor	Avo	Tou	Orl	Mon
Poitiers	**3.4**	3.3	3.5	3.4	3.6	3.9	2.5
Limoges	3.4	**3.2**	3.4	3.3	3.4	3.8	2.4
Bordeaux	3.2	3.0	**3.3**	3.2	3.3	3.6	2.3
Avord	3.8	3.7	3.9	**3.8**	3.9	4.4	2.7
Toulouse	3.4	3.3	3.5	3.4	**3.5**	3.8	2.4
Orléans	3.7	3.6	3.8	3.7	3.8	**4.2**	2.7
Mont de Marsan	3.1	3.0	3.2	3.1	3.3	3.5	**2.3**

Table 9.15: Four French stations situated in the Massif Central are compared. The stations Clermont-Ferrand, Saint Yan and Vichy are situated in the connected plains of Limange, Loire and L'Allier north of the Massif Central, and they compare well.

	Cle	Vic	Sai	Le
Clermont-Ferrand	**2.9**	2.8	2.7	2.4
Vichy	2.7	**2.6**	2.5	2.3
Saint Yan	2.8	2.7	**2.6**	2.3
Le Puy Chadrac	3.3	3.3	3.2	**2.8**

Table 9.16: Nine French stations from the Massif Central, the Rhone valley and the Mediterranean coast are compared. Most of the locations are in complicated topography and comparisons are difficult. In general, the stations should be considered representative only of their specific locations and nearby surroundings with similar orographic characteristics.

	Car	Per	Gou	Aur	Mil	Ist	Nîm	Sai	Lyo
Carcassonne	**5.0**	5.0	3.2	2.5	4.0	4.8	4.1	2.8	3.1
Perpignan	5.4	**5.1**	3.4	2.6	4.1	5.0	4.2	2.9	3.3
Gourdon	4.4	4.2	**2.8**	2.2	3.4	4.1	3.5	2.4	2.7
Aurillac	5.4	4.9	3.4	**2.6**	4.0	4.7	4.0	2.9	3.2
Millau	7.0	7.2	4.7	3.7	**5.4**	6.7	5.7	4.0	4.5
Istres	6.1	5.9	3.9	3.0	4.6	**5.6**	4.7	3.3	3.8
Nîmes	5.6	5.3	3.6	2.8	4.3	5.2	**4.4**	3.2	3.5
Saint Etienne	4.8	4.8	3.1	2.4	3.6	4.4	3.7	**2.7**	3.0
Lyon	4.8	4.7	3.2	2.5	4.0	4.9	4.2	2.8	**3.2**

Table 9.17: Comparison of two stations in North-Eastern Spain. The station at Gerona is very sheltered and comparison is difficult.

	Ger	Bar
Gerona	**2.3**	2.8
Barcelona	2.7	**3.4**

Table 9.18: Comparison of three stations on the east coast of Spain. The two stations Murcia and Alicante compare reasonably well considering the differences in their topographical setting. Valencia lies more than hundred kilometres to the north and is separated from the other two by a large mountainous area.

	Val	Ali	Mur
Valencia	**3.3**	4.0	4.9
Alicante	3.2	**3.9**	5.0
Murcia	2.9	3.6	**4.4**

Table 9.19: Comparison of three stations in Southern Spain. The two stations at Málaga and Almería both lie at the coast, but are separated by a distance of 200 km. Granada lies approximately 50 km inland behind the Sierra Nevada mountain chain.

	Mál	Gra	Alm
Málaga	**3.7**	2.1	3.6
Granada	4.2	**2.3**	3.9
Almería	3.9	2.3	**3.8**

Table 9.20: Comparison of two Portuguese and one Spanish station in the southwest of the Iberian peninsula. The two Portuguese coastal stations compare well and even though Sevilla also show good comparison this station is separated from the other two by more than 200 km and is situated approximately 50 km inland.

	Sev	Far	Sag
Sevilla	**3.0**	3.3	3.6
Faro	3.3	**3.6**	3.8
Sagres	5.4	5.9	**5.5**

Table 9.21: Comparison of three stations in North-Western Spain. The stations are situated in complex topography and they do not compare well.

	Cor	San	Avi
La Coruña	**4.2**	3.7	2.4
Santiago de Compostela	4.7	**3.8**	2.4
Avilés	5.4	4.2	**2.8**

Table 9.22: Comparison of six stations on the Canary Islands, Spain. The separation between neighbouring stations is typically 100 km or more. Even though the stations are situated in the same high wind regime of the NE trade winds, the high volcanic mountains influence the flow strongly. Hence, intercomparison is difficult. Note that the data have not been corrected for the effects of the large mountains.

	Pal	Lan	Fue	TRS	Hie	TLR
Las Palmas	**7.3**	6.1	5.4	6.3	5.4	8.1
Lanzarote	7.2	**6.1**	5.4	6.4	5.5	8.1
Fuerteventura	8.5	7.1	**6.2**	6.9	6.5	9.2
Tenerife (R. Sofía)	6.8	5.8	5.1	**5.6**	5.0	7.3
El Hierro	10.1	8.3	7.2	7.8	**7.6**	10.5
Tenerife (Los Rodeos)	5.9	5.2	4.5	4.7	4.5	**6.2**

Table 9.23: Comparison of two stations on the Azores Islands, Portugal. The stations are separated by approximately 600 km.

	Flo	San
Flores	**4.7**	4.3
Santa Maria	6.7	**5.8**

Table 9.24: Comparison of two stations on the islands of Madeira and Porto Santo, Portugal. The wind conditions at Funchal are influenced by the large mountains on Madeira, these effects are not corrected for and comparison is therefore difficult.

	Fun	Por
Funchal	**5.0**	4.1
Porto Santo	5.3	**4.6**

Table 9.25: Comparison of five stations in Portugal. The two south coast stations Faro and Sagres compare well. The other stations are separated by mountain chains and considerable distances.

	Far	Sag	Sin	Lis	Cab
Faro	**3.6**	3.8	3.0	4.2	2.9
Sagres	5.9	**5.5**	4.5	6.2	4.4
Sines	5.2	6.2	**4.5**	6.8	4.6
Lisboa	3.6	4.0	3.0	**4.3**	3.0
Cabo Carvoeiro	5.9	7.0	5.1	7.4	**4.8**

Table 9.26: Comparison of three stations in Southern Italy. Three stations in Apuglia are compared. They compare well and the data from the stations are representative for the region in which the landscape is relatively uncomplicated.

	Gio	Bri	Lec
Gioia del Colle	**3.6**	4.0	3.8
Brindisi	4.2	**4.6**	4.4
Lecce Galatina	3.5	3.9	**3.7**

Table 9.27: Comparison of two stations in central Italy. The stations compare well, but the area is of low winds.

	Pis	Gro
Pisa	**2.2**	2.3
Grosseto	2.2	**2.3**

Table 9.28: Comparison of six stations on Sardinia, Italy. Three groupings appear: three stations in the northern part of the Campidano valley (Monte Arci, Santa Anna and Cirras), two stations in the southern part (Cagliary and San Gilla), and Santa Catarina on the southwest coast of the island. In the first group Monte Arci and Cirras compare well, but Santa Anna deviates significantly. The second group consist of two stations located less than five kilometres apart and they compare well.

	Mon	Ann	Cir	Cag	Gil	Cat
Monte Arci	**5.8**	4.8	6.2	7.0	7.2	6.3
Santa Anna	4.4	**3.7**	4.7	5.4	5.6	4.8
Cirras	4.8	3.9	**5.1**	5.7	5.8	5.1
Cagliari	3.5	2.9	3.6	**4.2**	4.3	3.7
San Gilla	4.3	3.5	4.7	5.3	**5.6**	4.7
Santa Caterina	4.8	4.0	5.0	5.9	6.0	**5.3**

Table 9.29: Comparison of two stations in Western Greece. The two stations are located far apart and in very different topographical settings and do not compare well.

	Ara	Ker
Araxos	**3.7**	2.0
Kerkyra	4.1	**2.6**

Table 9.30: Comparison of seven Greek stations around the Aegean Sea. The stations cover a large area and are mostly situated in complicated topography which makes intercomparison difficult.

	Nax	Lim	Rod	Her	Myt	Ath	The
Naxos	**7.0**	4.5	5.8	5.6	5.5	4.7	4.3
Limnos (APT)	6.4	**5.4**	5.4	5.2	5.1	4.8	4.1
Rodos	5.9	4.8	**4.8**	4.5	4.4	4.2	3.7
Heraklion	6.0	5.5	4.9	**4.7**	4.6	4.5	3.9
Mytilini	6.8	5.5	4.4	5.0	**4.8**	4.8	4.1
Athina	5.4	4.6	5.1	4.7	4.6	**4.0**	3.6
Thessaloniki	5.1	4.2	5.0	4.5	4.2	3.8	**3.5**

9.2 Validation against high meteorological masts

The intercomparison of statistics from the meteorological stations presented above does not provide a thorough test of the model predictions at heights greater than a few tens of metres because the synoptic wind measurements are taken at low heights. However, a number of higher masts, at which wind data have been measured, exist in Europe and elsewhere. To illustrate the ability to model the variation of the Weibull parameters to greater heights, data from six high masts are presented here. For each mast the data from the lowest measurement level have been used to predict wind distributions at the higher levels. The following tables list Weibull parameters and wind power density [Wm^{-2}] for measured and predicted wind distributions for each mast.

For the Ferrel, Kivenlahti, Näsudden, Risø and Sprogø masts accurate roughness descriptions were prepared from topographical maps. For the Cabauw mast the data were available only as total azimuth independent wind frequency distribution and the results of two surface roughness assignments are given as indicated in the table.

Table 9.31: Cabauw mast, the Netherlands. Data are given in the form of a frequency table covering one year 1978/79 (Wieringa, 1989). The mast is situated inland in a rural setting of rather open appearance on the larger scale. Nearby trees and shelter-belts have a local influence. Results for two different surface roughness assignments are given, the higher roughness being the more realistic.

Height	Measured			Predicted					
				$z_0 = 5$ cm			$z_0 = 15$ cm		
z	A	k	E	A	k	E	A	k	E
10 m	4.7	1.79	97	4.7	1.79	98	4.7	1.78	98
40 m	6.5	2.09	218	6.6	1.99	235	6.4	2.06	204
80 m	8.0	2.52	343	7.8	2.19	352	7.5	2.25	312
120 m	9.0	2.47	487	8.6	2.23	473	8.4	2.27	435
200 m	9.9	2.28	698	9.9	2.18	727	9.9	2.21	709

Table 9.32: Ferrel mast, Portugal. The data cover the two years 1977-78. Located at the coast 10 km northeast of Cabo Carvoeiro. The mast was situated 3.5 km north-east of the village of Ferrel. The distance to the sea is 300 m to the northwest. To the southeast the landscape is undulating and covered by vegetation. Close to the mast the terrain consists of sand dunes.

Height	Measured			Predicted		
z	A	k	E	A	k	E
10 m	5.8	1.83	171	5.8	1.83	171
30 m	7.2	2.09	289	7.0	1.94	286
100 m	8.6	2.33	450	8.4	2.04	467

Table 9.33: Kivenlahti mast, Finland. Data cover the years 1978-79. The mast is located in dense forest, the treetops reaching 15-20 m. A cleared area around the mast extends to only some tens of metres. A 10-m displacement length and a surface roughness of 70 cm are assumed.

Height	Measured			Predicted		
z	A	k	E	A	k	E
21 m	3.3	1.56	40	3.4	1.59	44
92 m	6.2	2.09	185	6.3	1.86	218
224 m	8.4	2.02	476	8.0	1.93	438

Table 9.34: Näsudden mast, Sweden. Data cover the years 1980-85. The mast is located on the small peninsula Näsudden on the island of Gotland. The distance to the Baltic sea is a little more than one kilometre in directions from south to south-west. Near the mast the terrain consists of low dense bushes and scattered trees. Further away from the mast the terrain is hilly and forested.

Height	Measured				Predicted			
z	M	A	k	E	M	A	k	E
10 m	5.1	5.8	1.99	157	5.1	5.7	1.96	154
38 m	7.0	7.8	2.02	381	7.0	7.9	2.10	385
54 m	7.5	8.4	2.10	465	7.7	8.6	2.13	493
75 m	8.0	9.0	2.10	555	8.1	9.1	2.13	585
96 m	8.4	9.5	2.12	647	8.4	9.5	2.12	654
120 m	8.6	9.7	2.13	692	8.8	9.9	2.10	750
145 m	9.1	10.3	2.15	818	9.1	10.3	2.08	845

Table 9.35: Risø mast, Denmark. Continuous data from this mast are available from 1957 to the present time. Because of changeover of the measuring heights and data aquisition system, the last available 10 years, covering the period 1976-86, are used here. The surrounding terrain is rather inhomogeneous with the fjord to the west and open farmland to the east.

Height	Measured			Predicted		
z	A	k	E	A	k	E
11 m	5.4	1.87	135	5.3	1.87	134
27 m	6.7	1.99	249	6.7	1.96	254
43 m	7.5	2.05	332	7.3	2.11	302
76 m	8.3	2.20	428	8.2	2.25	403
117 m	9.1	2.30	536	9.1	2.29	535

Table 9.36: Sprogø mast, Denmark. Data cover 4 years (1983-88). The mast is situated on the small island of Sprogø in the middle of Storebælt (Great Belt). The mast stands on a long narrow spit of land only 50 m wide and extending 300 m east of the island proper. Except for the 240°-270° sector, the approach to the mast is over several kilometres of open water. The distance to the islands of Sjælland to the east and Fyn to the west is aproximately 10 km.

Height	Measured			Predicted		
z	A	k	E	A	k	E
8 m	7.1	2.02	289	7.0	2.01	282
18 m	7.6	2.07	342	7.8	2.14	357
55 m	8.9	2.26	513	8.9	2.33	499
68 m	9.2	2.31	547	9.2	2.31	555

Chapter 10

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10.2 European wind climate studies†

A multitude of climatological publications exists in all European countries, most of them published in the language of the issuing country. From these sources information on different climatic variables can be obtained, for example temperature, precipitation, and solar radiation. Unfortunately the wind climate is often either omitted or summarily dealt with, e.g. by presentation of wind roses and monthly averages of measured winds. Despite such shortcomings these publications can provide additional information to supplement the Wind Atlas.

Some wind data not included in the Atlas, such as statistics on extreme winds, may be found in the selected wind climatological publications listed below. The first list is arranged by subject and gives short references country by country (the full literature reference can be found in the second list). In the second list the publications for each country are given in alphabetical order.

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Wind climatological references by subject and country

Averages of surface winds

Belgium:	Malet (1978)
Denmark:	Larsen and Jensen (1983)
France:	Duchêne-Marullaz (1977)
Germany (FRG):	Christoffer and Ulbricht-Eissing (1989)
Greece:	Carapiperis (1970), Metaxas (1973), Lalas et al. (1983)
Ireland:	Rohan (1986)
Italy:	Lavagnini et al. (1982, 1983, 1985)
Netherlands:	Wieringa and Rijkoort (1983), Wieringa (1986)
United Kingdom:	Caton (1976)
All European countries:	Landsberg and Wallén (1970, 1977)

Surface wind frequency distributions

Distributions which are classified coarser than 12 Beaufort classes are not listed here as such. On the other hand, publications of Weibull parameters are included.

Belgium:	Bodeux (1977), Malet (1978)
Denmark:	Frydendahl (1971), Petersen et al. (1981)
France:	Duchêne-Marullaz (1977)
	Chémery and Duchêne-Marullaz (1987)
Germany (FRG):	Christoffer and Ulbricht-Eissing (1989)
Greece:	Galanis (1977), Lalas et al. (1983)
Ireland:	Butler and Farley (1973), Rohan (1986)
Italy:	Lavagnini et al. (1982, 1983, 1985)
Netherlands:	Wieringa and Rijkoort (1983)
United Kingdom:	Shellard (1968)

Other surface wind statistics

Denmark:	Frydendahl (1971), Larsen and Jensen (1983)
France:	Chémery and Duchêne-Marullaz (1987)
Germany (FRG):	Christoffer and Ulbricht-Eissing (1989)
Italy:	Lavagnini and Martorelli (1987)
Netherlands:	Wieringa and Rijkoort (1983)
United Kingdom:	Cook (1985)

Wind statistics for greater heights

Belgium:	Van der Auwera et al. (1980)
Denmark:	Petersen et al. (1981), Larsen and Jensen (1983)
France:	Dettwiller (1969)
Germany (FRG):	Frankenberger (1968), Fiedler (1970)
	Manier and Benesch (1977), Tetzlaff et al. (1984)
	Christoffer and Ulbricht-Eissing (1989)
	Wieringa (1989)
Netherlands:	Wieringa (1988, 1989)

Extreme winds, tornadoes etc.

Belgium:	Sneyers and Van Diepenbeeck (1982)
Denmark:	Jensen and Franck (1970)
France:	Chémery and Duchêne-Marullaz (1987)
Germany (FRG):	Schmidt (1980), Schroers and Lösslein (1983)
	Böllmann and Jurksch (1984), Duensing et al. (1985)
Ireland:	Logue (1975), Rohan (1986)
Italy:	Palmieri and Pulcini (1979), Gaudiosi et al. (1985)
Netherlands:	Rijkoort (1983), Wieringa and Rijkoort (1983)
	Wieringa (1986)
United Kingdom:	Hardman et al. (1973), Meaden (1976), Cook (1985)
	Cook and Prior (1987)
All European countries:	Ferry Borges and Castanheta (1973), Berz (1980)

Selected studies with local wind data

France:	Bordreuil et al. (1973), Orieux and Pouget (1984)
	Delaunay (1984), Delaunay and Sacré (1985)
	Ascensio (1985)
Germany (FRG):	Franken (1962), Cappel and Kalb (1976)
	Kalb and Schmidt (1977), Schäfer (1982),
	Lefebvre et al. (1983)
	Bätjer and Heinemann (1983), Höschele and Kalb (1988)
Greece:	Livadas and Sahsamanogolou (1973), Lalas (1985)
	Katsoulis and Kambezidis (1986), Dikaiakos (1986)
Ireland:	DHI (1976)
Italy:	Bassani et al. (1986), D'Alessandro et al. (1981)
	Flocchini et al. (1983), Fantuzi (1987)
Netherlands:	Van der Hoeven (1975)
	Van der Hoeven and Van Vliet (1986)
	Oemraw (1982-1986)
Portugal:	Mendes and Coelho (1987)
Spain:	Adell et al. (1985, 1987), Catalunya (1985)
United Kingdom:	Smith (1982)

Information reviews

France:	Desroziers and Vivier (1985)
Germany (FRG):	Kant (1980)
Netherlands:	Wieringa (1983)
United Kingdom:	Collingbourne (1978)
All European countries:	Landsberg and Wallén (1970, 1977)

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- München (Schäfer, P.J. (1982). Ber. D. Wetterd. 159)
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Appendix A

List of symbols

Vector is denoted '$\vec{x}$', apostrophe 'x'' denotes deviation from the mean and bar '$\overline{x}$' denotes mean value. Some abbreviations used in the text are included.

a	slope of ψ-functions at neutral
A	scale parameter in Weibull distribution, empirical constant in geostrophic drag law ($= A(0)$)
$A(\mu)$	empirical function in geostrophic drag law
A_H	horizontal area per roughness element
A_R	rotor area, swept area
b	constant
B	empirical constant in geostrophic drag law ($= B(0)$)
$B(\mu)$	empirical function in geostrophic drag law
c	constant, width of coastal zone
c_p	heat capacity of air at constant pressure
c_j^n	jth zero of nth Bessel function ($J_n(c_j^n) = 0$)
$C_p(u)$	efficiency at wind speed u
$C_p(u_m)$	maximum efficiency
C, Cor	correction factor
D	direction, distance, turning of wind
E	longitude east, UTM Easting
E	available mean power density (energy flux)
$E(u)$	available mean power density at wind speed u
$\exp(x)$	exponential function
f	Coriolis parameter, frequency of occurrence
f_E	conversion factor for energy density

f_u	conversion factor for wind speed
$f(u)$	Weibull distribution (probability density function)
$f(z)$	wind speed profile function
F	form factor
$F(u)$	Weibull distribution (cumulative probability function)
$F_A(k)$	function tabulated in Appendix B, Table B.6
$F_E(k)$	function tabulated in Appendix B, Table B.2
$F_k(M^2/\overline{u^2})$	function tabulated in Appendix B, Table B.5
$F_M(k)$	function tabulated in Appendix B, Table B.3
$F_u(k)$	function tabulated in Appendix B, Table B.4
g	acceleration of gravity
G	geostrophic wind speed
$G_k(\alpha)$	function tabulated in Appendix B, Table B.7
GMT	Greenwich Mean Time
h	height of roughness element, obstacle, hill, and internal boundary layer
H	height, hub height
H_0	surface heat flux
i	index, imaginary unit, turbulence intensity
IBL	internal boundary layer
j	index
J_n	nth order Bessel function
k	shape parameter in Weibull distribution, index
K	coefficient
l	distance, height of maximum relative speed-up
L	distance, length, half-width of hill, Monin-Obukhov length
$\ln(x)$	natural logarithm function
m	constant
M	mean value
m a.g.l.	metres above ground level (height)
m a.s.l.	metres above sea level (altitude)
$\max(x,y)$	largest value of x and y
$\min(x,y)$	smallest value of x and y
n	index
N	latitude north, UTM Northing
P	mean power (long-term average), porosity of obstacle
P_{max}	rated power

$P(u)$	mean power at wind speed u
Pr	probability
$Pr(u)$	probability density function
r	index, radius
rms	root-mean-square
rpm	rotations per minute
R	radius
R_1, R_2	shelter reduction factors
Ro	surface Rossby number
s	index, slope of power curve
S	standard deviation, cross-section
t	time
T	time period, absolute temperature
T_0	surface absolute temperature
u	wind speed, horizontal wind speed component (x-axis)
$\vec{u}$	wind velocity vector
u_m	wind speed at which turbine efficiency is at maximum
u_p	wind speed corresponding to power P
u_0	reference wind speed
u_*	friction velocity
u_{*0}	surface friction velocity
$u(z)$	wind speed at height z
$\overline{u^2}$	mean square value of wind speed
UTC	Coordinated Universal Time; equals GMT
UTM	Universal Transverse Mercator
v	horizontal wind speed component (y-axis)
w	weighting factor, vertical wind speed component (z-axis)
w_0	terrain-induced vertical wind velocity
W	longitude west
W	weighting factor
x	distance
z	height above ground
z_m	height of minimum variance of wind speed
z_0	roughness length
z_0^R	area-weighted roughness length
α	wind speed divided by A, angle, constant

β	constant
$\gamma(x,y)$	incomplete gamma function
$\Gamma(x)$	gamma function
Δ	difference operator, relative error, weighting factor, offset
ΔS	relative speed up ($\Delta S = (u_2 - u_1)/u_1$)
ΔS_H	relative speed-up at height H
∇	gradient operator
η	constant, function
θ	tip pitch angle
κ	von Kármán constant (= 0.4)
λ	longitude
μ	stability parameter
ν	kinematic viscosity
ρ	air density
σ	standard deviation
τ	surface stress
ϕ	latitude, angle, azimuth
χ	potential
ψ	empirical stability function in wind profile

Appendix B

Auxiliary tables

Table B.1: Air density ρ [kg m^{-3}] as a function of altitude z [m] and mean temperature (−25 to 40°C) at the same altitude z. A lapse rate of 6.5 $K km^{-1}$ and a sea level pressure of 1013.25 mb are assumed.

z	−5	0	5	10	15	20	25	30	35	40
0	1.316	1.292	1.269	1.247	1.225	1.204	1.184	1.164	1.145	1.127
100	1.300	1.276	1.254	1.232	1.211	1.190	1.170	1.151	1.133	1.115
200	1.283	1.260	1.238	1.217	1.196	1.176	1.157	1.138	1.120	1.103
300	1.267	1.245	1.223	1.202	1.182	1.163	1.144	1.126	1.108	1.091
400	1.251	1.230	1.208	1.188	1.169	1.150	1.131	1.113	1.096	1.079

z	−10	−5	0	5	10	15	20	25	30	35
500	1.258	1.236	1.214	1.194	1.174	1.155	1.136	1.118	1.101	1.084
600	1.242	1.220	1.199	1.179	1.160	1.141	1.123	1.106	1.089	1.072
700	1.226	1.205	1.185	1.165	1.146	1.128	1.110	1.093	1.077	1.061
800	1.210	1.190	1.170	1.151	1.133	1.115	1.098	1.081	1.065	1.049
900	1.195	1.175	1.156	1.138	1.120	1.102	1.085	1.069	1.053	1.038

z	−15	−10	−5	0	5	10	15	20	25	30
1000	1.200	1.180	1.161	1.142	1.124	1.106	1.089	1.073	1.057	1.042
1100	1.184	1.165	1.146	1.128	1.111	1.094	1.077	1.061	1.045	1.030
1200	1.169	1.151	1.132	1.115	1.097	1.081	1.065	1.049	1.034	1.019
1300	1.154	1.136	1.118	1.101	1.084	1.068	1.052	1.037	1.022	1.008
1400	1.140	1.122	1.105	1.088	1.072	1.056	1.040	1.025	1.011	0.997

z	−20	−15	−10	−5	0	5	10	15	20	25
1500	1.143	1.125	1.108	1.091	1.075	1.059	1.043	1.028	1.014	1.000
1600	1.128	1.111	1.094	1.078	1.062	1.046	1.031	1.017	1.003	0.989
1700	1.114	1.097	1.081	1.065	1.049	1.034	1.019	1.005	0.991	0.978
1800	1.100	1.083	1.067	1.052	1.037	1.022	1.008	0.994	0.980	0.967
1900	1.086	1.070	1.054	1.039	1.024	1.010	0.996	0.983	0.969	0.957

z	−25	−20	−15	−10	−5	0	5	10	15	20
2000	1.088	1.072	1.056	1.041	1.026	1.012	0.998	0.985	0.971	0.959
2100	1.074	1.058	1.043	1.028	1.014	1.000	0.987	0.973	0.961	0.948
2200	1.060	1.045	1.030	1.016	1.002	0.988	0.975	0.962	0.950	0.938
2300	1.046	1.031	1.017	1.003	0.990	0.977	0.964	0.951	0.939	0.927
2400	1.033	1.018	1.005	0.991	0.978	0.965	0.953	0.941	0.929	0.917

Table B.2: Table of $F_E(k)$.

Table for calculating the total power density in the wind from the Weibull parameters A and k (Eq. 5.4). The value of $F_E(k)$ is found from the table entry corresponding to the value of k. Enter the row given by the first two digits in k and the column given by the third digit in k. Assuming an air density of 1.225 $\mathrm{kg\,m^{-3}}$ the power density with dimension [$\mathrm{kWh\,m^{-2}\,y^{-1}}$] is then $E = A^3 F_E(k)$.

	0	1	2	3	4	5	6	7	8	9
1.0	32.220	31.044	29.940	28.902	27.926	27.006	26.139	25.321	24.547	23.816
1.1	23.123	22.467	21.845	21.254	20.692	20.159	19.651	19.167	18.706	18.266
1.2	17.846	17.445	17.062	16.696	16.345	16.009	15.687	15.379	15.082	14.798
1.3	14.525	14.263	14.011	13.768	13.535	13.310	13.093	12.885	12.683	12.489
1.4	12.302	12.121	11.946	11.777	11.614	11.456	11.304	11.156	11.013	10.874
1.5	10.740	10.610	10.484	10.361	10.243	10.128	10.016	9.907	9.802	9.699
1.6	9.600	9.503	9.409	9.318	9.229	9.142	9.058	8.976	8.896	8.818
1.7	8.742	8.668	8.596	8.526	8.457	8.390	8.325	8.261	8.199	8.139
1.8	8.080	8.022	7.965	7.910	7.856	7.804	7.752	7.702	7.653	7.604
1.9	7.557	7.511	7.466	7.422	7.379	7.337	7.296	7.255	7.215	7.177
2.0	7.139	7.101	7.065	7.029	6.994	6.960	6.926	6.893	6.860	6.829
2.1	6.797	6.767	6.737	6.707	6.679	6.650	6.622	6.595	6.568	6.542
2.2	6.516	6.491	6.466	6.441	6.417	6.394	6.370	6.348	6.325	6.303
2.3	6.282	6.260	6.239	6.219	6.199	6.179	6.159	6.140	6.121	6.102
2.4	6.084	6.066	6.049	6.031	6.014	5.997	5.980	5.964	5.948	5.932
2.5	5.917	5.901	5.886	5.871	5.857	5.842	5.828	5.814	5.800	5.787
2.6	5.773	5.760	5.747	5.735	5.722	5.710	5.697	5.685	5.673	5.662
2.7	5.650	5.639	5.628	5.617	5.606	5.595	5.584	5.574	5.564	5.554
2.8	5.544	5.534	5.524	5.514	5.505	5.496	5.486	5.477	5.468	5.460
2.9	5.451	5.442	5.434	5.425	5.417	5.409	5.401	5.393	5.385	5.378
3.0	5.370	5.362	5.355	5.348	5.340	5.333	5.326	5.319	5.312	5.306
3.1	5.299	5.292	5.286	5.279	5.273	5.267	5.261	5.255	5.248	5.243
3.2	5.237	5.231	5.225	5.219	5.214	5.208	5.203	5.197	5.192	5.187
3.3	5.182	5.176	5.171	5.166	5.161	5.156	5.152	5.147	5.142	5.137
3.4	5.133	5.128	5.124	5.119	5.115	5.111	5.106	5.102	5.098	5.094
3.5	5.090	5.086	5.082	5.078	5.074	5.070	5.066	5.062	5.059	5.055
3.6	5.051	5.048	5.044	5.041	5.037	5.034	5.030	5.027	5.024	5.020
3.7	5.017	5.014	5.011	5.008	5.005	5.002	4.998	4.995	4.993	4.990
3.8	4.987	4.984	4.981	4.978	4.976	4.973	4.970	4.967	4.965	4.962
3.9	4.960	4.957	4.955	4.952	4.950	4.947	4.945	4.942	4.940	4.938

Table B.3: Table of $F_M(k)$.

Table for calculating the mean value from the Weibull parameters A and k (Eq. 5.7). The value of $F_M(k) = \Gamma(1 + 1/k)$ is found from the table entry corresponding to the value of k. Enter the row given by the first two digits in k and the column given by the third digit in k. The mean value with dimension [m s^{-1}] is then $M = AF_M(k)$. Note that the value of $F_M(k)$ varies only slightly and usually it can be chosen as 0.888.

	0	1	2	3	4	5	6	7	8	9
1.0	1.000	0.996	0.992	0.988	0.984	0.981	0.977	0.974	0.971	0.968
1.1	0.965	0.962	0.959	0.957	0.954	0.952	0.949	0.947	0.945	0.943
1.2	0.941	0.939	0.937	0.935	0.933	0.931	0.930	0.928	0.927	0.925
1.3	0.924	0.922	0.921	0.919	0.918	0.917	0.916	0.915	0.914	0.912
1.4	0.911	0.910	0.909	0.909	0.908	0.907	0.906	0.905	0.904	0.903
1.5	0.903	0.902	0.901	0.901	0.900	0.899	0.899	0.898	0.898	0.897
1.6	0.897	0.896	0.896	0.895	0.895	0.894	0.894	0.893	0.893	0.893
1.7	0.892	0.892	0.892	0.891	0.891	0.891	0.890	0.890	0.890	0.890
1.8	0.889	0.889	0.889	0.889	0.888	0.888	0.888	0.888	0.888	0.888
1.9	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.886	0.886	0.886
2.0	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886
2.1	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886
2.2	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886
2.3	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886	0.886
2.4	0.886	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887
2.5	0.887	0.887	0.887	0.888	0.888	0.888	0.888	0.888	0.888	0.888
2.6	0.888	0.888	0.888	0.889	0.889	0.889	0.889	0.889	0.889	0.889
2.7	0.889	0.889	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
2.8	0.890	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.892
2.9	0.892	0.892	0.892	0.892	0.892	0.892	0.892	0.893	0.893	0.893
3.0	0.893	0.893	0.893	0.893	0.894	0.894	0.894	0.894	0.894	0.894
3.1	0.894	0.894	0.895	0.895	0.895	0.895	0.895	0.895	0.895	0.896
3.2	0.896	0.896	0.896	0.896	0.896	0.896	0.896	0.897	0.897	0.897
3.3	0.897	0.897	0.897	0.897	0.898	0.898	0.898	0.898	0.898	0.898
3.4	0.898	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.899	0.900
3.5	0.900	0.900	0.900	0.900	0.900	0.900	0.901	0.901	0.901	0.901
3.6	0.901	0.901	0.901	0.902	0.902	0.902	0.902	0.902	0.902	0.902
3.7	0.902	0.903	0.903	0.903	0.903	0.903	0.903	0.903	0.904	0.904
3.8	0.904	0.904	0.904	0.904	0.904	0.904	0.905	0.905	0.905	0.905
3.9	0.905	0.905	0.905	0.905	0.906	0.906	0.906	0.906	0.906	0.906

Table B.4: Table of $F_u(k)$.

Table for calculating the mean square speed from the Weibull parameters A and k (Eq. 5.7). The value of $F_u(k) = \Gamma(1 + 2/k)$ is found from the table entry corresponding to the value of k. Enter the row given by the first two digits in k and the column given by the third digit in k. The mean square value with dimension [m^2s^{-2}] is then $\overline{u^2} = A^2F_u(k)$.

	0	1	2	3	4	5	6	7	8	9
1.0	2.000	1.964	1.930	1.897	1.865	1.835	1.806	1.779	1.752	1.727
1.1	1.702	1.679	1.657	1.635	1.614	1.594	1.575	1.556	1.538	1.521
1.2	1.505	1.489	1.473	1.458	1.444	1.430	1.416	1.403	1.390	1.378
1.3	1.366	1.355	1.344	1.333	1.322	1.312	1.302	1.293	1.284	1.275
1.4	1.266	1.257	1.249	1.241	1.233	1.226	1.218	1.211	1.204	1.197
1.5	1.191	1.184	1.178	1.172	1.166	1.160	1.154	1.149	1.143	1.138
1.6	1.133	1.128	1.123	1.118	1.114	1.109	1.105	1.100	1.096	1.092
1.7	1.088	1.084	1.080	1.076	1.073	1.069	1.066	1.062	1.059	1.055
1.8	1.052	1.049	1.046	1.043	1.040	1.037	1.034	1.031	1.029	1.026
1.9	1.023	1.021	1.018	1.016	1.013	1.011	1.009	1.007	1.004	1.002
2.0	1.000	0.998	0.996	0.994	0.992	0.990	0.988	0.986	0.984	0.983
2.1	0.981	0.979	0.977	0.976	0.974	0.972	0.971	0.969	0.968	0.966
2.2	0.965	0.963	0.962	0.961	0.959	0.958	0.957	0.955	0.954	0.953
2.3	0.952	0.951	0.949	0.948	0.947	0.946	0.945	0.944	0.943	0.942
2.4	0.941	0.940	0.939	0.938	0.937	0.936	0.935	0.934	0.933	0.932
2.5	0.931	0.931	0.930	0.929	0.928	0.927	0.927	0.926	0.925	0.924
2.6	0.924	0.923	0.922	0.921	0.921	0.920	0.919	0.919	0.918	0.918
2.7	0.917	0.916	0.916	0.915	0.915	0.914	0.914	0.913	0.912	0.912
2.8	0.911	0.911	0.910	0.910	0.909	0.909	0.909	0.908	0.908	0.907
2.9	0.907	0.906	0.906	0.905	0.905	0.905	0.904	0.904	0.903	0.903
3.0	0.903	0.902	0.902	0.902	0.901	0.901	0.901	0.900	0.900	0.900
3.1	0.899	0.899	0.899	0.898	0.898	0.898	0.898	0.897	0.897	0.897
3.2	0.897	0.896	0.896	0.896	0.896	0.895	0.895	0.895	0.895	0.894
3.3	0.894	0.894	0.894	0.894	0.893	0.893	0.893	0.893	0.893	0.892
3.4	0.892	0.892	0.892	0.892	0.892	0.891	0.891	0.891	0.891	0.891
3.5	0.891	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.889
3.6	0.889	0.889	0.889	0.889	0.889	0.889	0.889	0.889	0.888	0.888
3.7	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.888	0.887
3.8	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887	0.887
3.9	0.887	0.887	0.887	0.887	0.886	0.886	0.886	0.886	0.886	0.886

Table B.5: Table of F_k.

Table of F_k for calculating the Weibull parameter k from the mean and the mean square in a Weibull distribution (Eq. 5.9). Enter the row given by the first two digits in the value of $\overline{M^2/u^2}$ and the column given by the third digit to obtain k.

	0	1	2	3	4	5	6	7	8	9
0.60	1.232	1.232	1.236	1.240	1.244	1.244	1.248	1.252	1.252	1.256
0.61	1.260	1.264	1.264	1.268	1.271	1.271	1.275	1.279	1.283	1.283
0.62	1.287	1.291	1.295	1.295	1.299	1.303	1.307	1.307	1.311	1.314
0.63	1.318	1.318	1.322	1.326	1.330	1.334	1.334	1.338	1.342	1.346
0.64	1.346	1.350	1.354	1.357	1.361	1.365	1.365	1.369	1.373	1.377
0.65	1.381	1.381	1.385	1.389	1.393	1.396	1.400	1.404	1.404	1.408
0.66	1.412	1.416	1.420	1.424	1.428	1.432	1.432	1.436	1.439	1.443
0.67	1.447	1.451	1.455	1.459	1.463	1.467	1.467	1.471	1.475	1.479
0.68	1.482	1.486	1.490	1.494	1.498	1.502	1.506	1.510	1.514	1.518
0.69	1.521	1.525	1.529	1.533	1.537	1.541	1.545	1.549	1.553	1.557
0.70	1.561	1.564	1.568	1.572	1.576	1.580	1.584	1.588	1.592	1.600
0.71	1.604	1.607	1.611	1.615	1.619	1.623	1.627	1.631	1.639	1.643
0.72	1.646	1.650	1.654	1.658	1.662	1.670	1.674	1.678	1.682	1.686
0.73	1.693	1.697	1.701	1.705	1.709	1.717	1.721	1.725	1.729	1.736
0.74	1.740	1.744	1.752	1.756	1.760	1.764	1.771	1.775	1.779	1.787
0.75	1.791	1.795	1.803	1.807	1.814	1.818	1.822	1.830	1.834	1.842
0.76	1.846	1.850	1.857	1.861	1.869	1.873	1.881	1.885	1.893	1.896
0.77	1.904	1.908	1.916	1.920	1.928	1.936	1.939	1.947	1.951	1.959
0.78	1.967	1.971	1.979	1.982	1.990	1.998	2.006	2.010	2.018	2.025
0.79	2.029	2.037	2.045	2.053	2.057	2.064	2.072	2.080	2.088	2.096
0.80	2.100	2.107	2.115	2.123	2.131	2.139	2.146	2.154	2.162	2.170
0.81	2.178	2.186	2.193	2.201	2.209	2.217	2.225	2.232	2.244	2.252
0.82	2.260	2.268	2.275	2.287	2.295	2.303	2.311	2.322	2.330	2.338
0.83	2.350	2.357	2.365	2.377	2.385	2.396	2.404	2.416	2.424	2.436
0.84	2.447	2.455	2.467	2.475	2.486	2.498	2.510	2.518	2.529	2.541
0.85	2.553	2.564	2.576	2.588	2.600	2.611	2.623	2.635	2.646	2.658
0.86	2.670	2.682	2.693	2.709	2.721	2.732	2.748	2.760	2.771	2.787
0.87	2.799	2.814	2.830	2.842	2.857	2.873	2.885	2.900	2.916	2.932
0.88	2.947	2.963	2.979	2.994	3.010	3.029	3.045	3.061	3.080	3.096
0.89	3.115	3.131	3.150	3.166	3.186	3.205	3.225	3.244	3.264	3.283
0.90	3.303	3.322	3.346	3.365	3.389	3.408	3.432	3.455	3.479	3.502

Table B.6: Table of $F_A(k)$.

Table for calculating the Weibull parameter A from the mean and the mean square (Eq. 5.9). The value of $F_A(k) = 1/\Gamma(1 + 1/k)$ is found from the table entry corresponding to the value of k. Enter the row given by the first two digits in k and the column given by the third digit in k. The Weibull parameter A with dimension $[\mathrm{m\,s^{-1}}]$ is then $A = \bar{u}F_A(k)$. Note that the value of $F_A(k)$ varies only slightly and usually it can be chosen as 1.126.

	0	1	2	3	4	5	6	7	8	9
1.0	1.000	1.004	1.008	1.012	1.016	1.020	1.023	1.027	1.030	1.033
1.1	1.036	1.039	1.042	1.045	1.048	1.051	1.053	1.056	1.058	1.061
1.2	1.063	1.065	1.068	1.070	1.072	1.074	1.076	1.077	1.079	1.081
1.3	1.083	1.084	1.086	1.088	1.089	1.091	1.092	1.093	1.095	1.096
1.4	1.097	1.098	1.100	1.101	1.102	1.103	1.104	1.105	1.106	1.107
1.5	1.108	1.109	1.109	1.110	1.111	1.112	1.113	1.113	1.114	1.115
1.6	1.115	1.116	1.117	1.117	1.118	1.118	1.119	1.119	1.120	1.120
1.7	1.121	1.121	1.122	1.122	1.122	1.123	1.123	1.124	1.124	1.124
1.8	1.124	1.125	1.125	1.125	1.126	1.126	1.126	1.126	1.127	1.127
1.9	1.127	1.127	1.127	1.127	1.128	1.128	1.128	1.128	1.128	1.128
2.0	1.128	1.128	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129
2.1	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129
2.2	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129	1.129
2.3	1.129	1.129	1.129	1.129	1.129	1.128	1.128	1.128	1.128	1.128
2.4	1.128	1.128	1.128	1.128	1.128	1.128	1.127	1.127	1.127	1.127
2.5	1.127	1.127	1.127	1.127	1.127	1.126	1.126	1.126	1.126	1.126
2.6	1.126	1.126	1.126	1.125	1.125	1.125	1.125	1.125	1.125	1.125
2.7	1.125	1.124	1.124	1.124	1.124	1.124	1.124	1.123	1.123	1.123
2.8	1.123	1.123	1.123	1.123	1.122	1.122	1.122	1.122	1.122	1.122
2.9	1.121	1.121	1.121	1.121	1.121	1.121	1.120	1.120	1.120	1.120
3.0	1.120	1.120	1.120	1.119	1.119	1.119	1.119	1.119	1.119	1.118
3.1	1.118	1.118	1.118	1.118	1.118	1.117	1.117	1.117	1.117	1.117
3.2	1.117	1.116	1.116	1.116	1.116	1.116	1.115	1.115	1.115	1.115
3.3	1.115	1.115	1.114	1.114	1.114	1.114	1.114	1.114	1.113	1.113
3.4	1.113	1.113	1.113	1.113	1.112	1.112	1.112	1.112	1.112	1.112
3.5	1.111	1.111	1.111	1.111	1.111	1.111	1.110	1.110	1.110	1.110
3.6	1.110	1.110	1.109	1.109	1.109	1.109	1.109	1.109	1.108	1.108
3.7	1.108	1.108	1.108	1.108	1.107	1.107	1.107	1.107	1.107	1.107
3.8	1.106	1.106	1.106	1.106	1.106	1.106	1.105	1.105	1.105	1.105
3.9	1.105	1.105	1.105	1.104	1.104	1.104	1.104	1.104	1.104	1.103

Table B.7: Table of $G_k(\alpha)$.

Table for calculating the mean power (Eq. 6.4). The value of $G_k(\alpha) = 1/k \cdot \gamma(1/k, \alpha^k)$ is found from the table entry corresponding to the values of α and k. Enter the row given by the value of α and the column given by the value of k.

	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.049	0.049	0.049	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
0.10	0.095	0.096	0.097	0.098	0.098	0.099	0.099	0.099	0.099	0.100	0.100
0.15	0.139	0.141	0.143	0.145	0.146	0.147	0.147	0.148	0.148	0.149	0.149
0.20	0.181	0.185	0.187	0.190	0.192	0.193	0.194	0.195	0.196	0.197	0.197
0.25	0.221	0.226	0.230	0.233	0.236	0.238	0.240	0.241	0.243	0.244	0.245
0.30	0.259	0.265	0.270	0.274	0.278	0.281	0.284	0.286	0.288	0.290	0.291
0.35	0.295	0.303	0.309	0.314	0.319	0.323	0.326	0.329	0.332	0.334	0.336
0.40	0.330	0.338	0.345	0.352	0.358	0.363	0.367	0.371	0.374	0.377	0.380
0.45	0.362	0.372	0.380	0.388	0.395	0.400	0.406	0.410	0.414	0.418	0.421
0.50	0.393	0.404	0.414	0.422	0.430	0.436	0.443	0.448	0.453	0.457	0.461
0.55	0.423	0.435	0.445	0.455	0.463	0.471	0.478	0.484	0.489	0.495	0.499
0.60	0.451	0.464	0.475	0.485	0.495	0.503	0.511	0.518	0.524	0.530	0.535
0.65	0.478	0.491	0.503	0.514	0.524	0.533	0.542	0.550	0.557	0.563	0.569
0.70	0.503	0.517	0.530	0.542	0.552	0.562	0.571	0.579	0.587	0.594	0.601
0.75	0.528	0.542	0.555	0.568	0.579	0.589	0.599	0.608	0.616	0.623	0.630
0.80	0.551	0.566	0.579	0.592	0.604	0.614	0.624	0.634	0.642	0.650	0.658
0.85	0.573	0.588	0.602	0.615	0.627	0.638	0.648	0.658	0.667	0.675	0.683
0.90	0.593	0.609	0.623	0.637	0.649	0.660	0.671	0.681	0.690	0.698	0.706
0.95	0.613	0.629	0.643	0.657	0.669	0.681	0.691	0.701	0.711	0.719	0.727
1.00	0.632	0.648	0.662	0.676	0.688	0.700	0.711	0.721	0.730	0.739	0.747
1.05	0.650	0.666	0.680	0.694	0.706	0.718	0.728	0.738	0.747	0.756	0.764
1.10	0.667	0.683	0.697	0.710	0.723	0.734	0.744	0.754	0.763	0.772	0.780
1.15	0.683	0.699	0.713	0.726	0.738	0.749	0.759	0.769	0.778	0.786	0.794
1.20	0.699	0.714	0.728	0.740	0.752	0.763	0.773	0.782	0.791	0.799	0.807
1.25	0.713	0.728	0.742	0.754	0.765	0.776	0.786	0.795	0.803	0.811	0.818
1.30	0.727	0.742	0.755	0.767	0.778	0.788	0.797	0.806	0.814	0.821	0.828
1.35	0.741	0.755	0.767	0.779	0.789	0.799	0.808	0.816	0.823	0.830	0.836
1.40	0.753	0.767	0.779	0.790	0.800	0.809	0.817	0.825	0.832	0.838	0.844
1.45	0.765	0.778	0.790	0.800	0.809	0.818	0.826	0.833	0.839	0.845	0.851

Table B.7: Table of $G_k(\alpha)$ (continued).

	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
1.50	0.777	0.789	0.800	0.809	0.818	0.826	0.833	0.840	0.846	0.851	0.856
1.55	0.788	0.799	0.809	0.818	0.826	0.834	0.840	0.846	0.852	0.857	0.861
1.60	0.798	0.809	0.818	0.826	0.834	0.841	0.847	0.852	0.857	0.861	0.865
1.65	0.808	0.818	0.826	0.834	0.841	0.847	0.852	0.857	0.861	0.865	0.869
1.70	0.817	0.826	0.834	0.841	0.847	0.853	0.857	0.862	0.865	0.869	0.872
1.75	0.826	0.834	0.842	0.848	0.853	0.858	0.862	0.866	0.869	0.872	0.874
1.80	0.835	0.842	0.848	0.854	0.859	0.863	0.866	0.869	0.872	0.874	0.877
1.85	0.843	0.849	0.855	0.859	0.863	0.867	0.870	0.872	0.875	0.877	0.878
1.90	0.850	0.856	0.861	0.865	0.868	0.871	0.873	0.875	0.877	0.878	0.880
1.95	0.858	0.862	0.866	0.869	0.872	0.874	0.876	0.877	0.879	0.880	0.881
2.00	0.865	0.868	0.872	0.874	0.876	0.877	0.878	0.879	0.880	0.881	0.882
2.05	0.871	0.874	0.876	0.878	0.879	0.880	0.881	0.881	0.882	0.882	0.883
2.10	0.878	0.880	0.881	0.882	0.882	0.883	0.883	0.883	0.883	0.883	0.884
2.15	0.884	0.885	0.885	0.885	0.885	0.885	0.885	0.884	0.884	0.884	0.884
2.20	0.889	0.889	0.889	0.888	0.888	0.887	0.886	0.885	0.885	0.885	0.885
2.25	0.895	0.894	0.893	0.891	0.890	0.889	0.887	0.886	0.886	0.885	0.885
2.30	0.900	0.898	0.896	0.894	0.892	0.890	0.889	0.887	0.886	0.886	0.885
2.35	0.905	0.902	0.899	0.897	0.894	0.892	0.890	0.888	0.887	0.886	0.885
2.40	0.909	0.906	0.902	0.899	0.896	0.893	0.891	0.889	0.887	0.886	0.886
2.45	0.914	0.909	0.905	0.901	0.897	0.894	0.891	0.889	0.888	0.886	0.886
2.50	0.918	0.913	0.908	0.903	0.899	0.895	0.892	0.890	0.888	0.887	0.886
2.55	0.922	0.916	0.910	0.905	0.900	0.896	0.893	0.890	0.888	0.887	0.886
2.60	0.926	0.919	0.912	0.906	0.901	0.897	0.893	0.890	0.888	0.887	0.886
2.65	0.929	0.922	0.914	0.908	0.902	0.898	0.894	0.891	0.889	0.887	0.886
2.70	0.933	0.924	0.916	0.909	0.903	0.898	0.894	0.891	0.889	0.887	0.886
2.75	0.936	0.927	0.918	0.911	0.904	0.899	0.895	0.891	0.889	0.887	0.886
2.80	0.939	0.929	0.920	0.912	0.905	0.899	0.895	0.891	0.889	0.887	0.886
2.85	0.942	0.931	0.921	0.913	0.906	0.900	0.895	0.892	0.889	0.887	0.886
2.90	0.945	0.933	0.923	0.914	0.906	0.900	0.895	0.892	0.889	0.887	0.886
2.95	0.948	0.935	0.924	0.915	0.907	0.900	0.895	0.892	0.889	0.887	0.886
3.00	0.950	0.937	0.925	0.915	0.907	0.901	0.896	0.892	0.889	0.887	0.886
3.05	0.953	0.939	0.926	0.916	0.908	0.901	0.896	0.892	0.889	0.887	0.886
3.10	0.955	0.940	0.927	0.917	0.908	0.901	0.896	0.892	0.889	0.887	0.886
3.15	0.957	0.942	0.928	0.917	0.908	0.901	0.896	0.892	0.889	0.887	0.886
3.20	0.959	0.943	0.929	0.918	0.909	0.902	0.896	0.892	0.889	0.887	0.886
∞	1.000	0.965	0.941	0.924	0.911	0.903	0.897	0.892	0.889	0.887	0.886

Table B.7: Table of $G_k(\alpha)$ (continued).

	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
0.10	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
0.15	0.149	0.149	0.149	0.149	0.150	0.150	0.150	0.150	0.150	0.150	0.150
0.20	0.197	0.198	0.198	0.199	0.199	0.199	0.199	0.199	0.199	0.200	0.200
0.25	0.245	0.246	0.246	0.247	0.247	0.248	0.248	0.248	0.249	0.249	0.249
0.30	0.291	0.292	0.294	0.294	0.295	0.296	0.296	0.297	0.297	0.298	0.298
0.35	0.336	0.338	0.339	0.341	0.342	0.343	0.344	0.345	0.345	0.346	0.346
0.40	0.380	0.382	0.384	0.386	0.387	0.389	0.390	0.391	0.392	0.393	0.394
0.45	0.421	0.424	0.427	0.429	0.431	0.433	0.435	0.436	0.438	0.439	0.440
0.50	0.461	0.465	0.468	0.471	0.474	0.476	0.478	0.480	0.482	0.483	0.485
0.55	0.499	0.503	0.507	0.511	0.514	0.517	0.520	0.522	0.524	0.526	0.528
0.60	0.535	0.540	0.544	0.549	0.552	0.556	0.559	0.562	0.565	0.567	0.570
0.65	0.569	0.574	0.580	0.584	0.589	0.593	0.596	0.600	0.603	0.606	0.609
0.70	0.601	0.607	0.612	0.618	0.622	0.627	0.631	0.635	0.639	0.642	0.645
0.75	0.630	0.637	0.643	0.649	0.654	0.659	0.664	0.668	0.672	0.676	0.680
0.80	0.658	0.665	0.671	0.677	0.683	0.688	0.693	0.698	0.703	0.707	0.711
0.85	0.683	0.690	0.697	0.704	0.710	0.715	0.721	0.726	0.731	0.735	0.739
0.90	0.706	0.714	0.721	0.728	0.734	0.740	0.745	0.751	0.756	0.761	0.765
0.95	0.727	0.735	0.742	0.749	0.756	0.762	0.767	0.773	0.778	0.783	0.788
1.00	0.747	0.755	0.762	0.769	0.775	0.781	0.787	0.793	0.798	0.803	0.808
1.05	0.764	0.772	0.779	0.786	0.792	0.799	0.804	0.810	0.815	0.820	0.825
1.10	0.780	0.788	0.795	0.801	0.808	0.814	0.819	0.825	0.830	0.834	0.839
1.15	0.794	0.801	0.808	0.815	0.821	0.827	0.832	0.837	0.842	0.847	0.851
1.20	0.807	0.814	0.820	0.827	0.832	0.838	0.843	0.848	0.852	0.857	0.861
1.25	0.818	0.825	0.831	0.837	0.842	0.847	0.852	0.857	0.861	0.865	0.869
1.30	0.828	0.834	0.840	0.845	0.851	0.855	0.860	0.864	0.868	0.872	0.875
1.35	0.836	0.842	0.848	0.853	0.858	0.862	0.866	0.870	0.874	0.877	0.880
1.40	0.844	0.849	0.854	0.859	0.863	0.867	0.871	0.875	0.878	0.881	0.884
1.45	0.851	0.856	0.860	0.864	0.868	0.872	0.875	0.878	0.881	0.884	0.887

Table B.7: Table of $G_k(\alpha)$ (continued).

	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
1.50	0.856	0.861	0.865	0.869	0.872	0.875	0.878	0.881	0.884	0.886	0.889
1.55	0.861	0.865	0.869	0.872	0.875	0.878	0.881	0.883	0.886	0.888	0.890
1.60	0.865	0.869	0.872	0.875	0.878	0.881	0.883	0.885	0.887	0.889	0.891
1.65	0.869	0.872	0.875	0.878	0.880	0.882	0.884	0.886	0.888	0.890	0.892
1.70	0.872	0.875	0.877	0.879	0.882	0.884	0.885	0.887	0.889	0.891	0.892
1.75	0.874	0.877	0.879	0.881	0.883	0.885	0.886	0.888	0.889	0.891	0.893
1.80	0.877	0.879	0.880	0.882	0.884	0.885	0.887	0.888	0.890	0.891	0.893
1.85	0.878	0.880	0.882	0.883	0.884	0.886	0.887	0.889	0.890	0.891	0.893
1.90	0.880	0.881	0.883	0.884	0.885	0.886	0.888	0.889	0.890	0.892	0.893
1.95	0.881	0.882	0.883	0.884	0.885	0.887	0.888	0.889	0.890	0.892	0.893
2.00	0.882	0.883	0.884	0.885	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.05	0.883	0.884	0.884	0.885	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.10	0.884	0.884	0.885	0.885	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.15	0.884	0.884	0.885	0.885	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.20	0.885	0.885	0.885	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.25	0.885	0.885	0.885	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.30	0.885	0.885	0.885	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.35	0.885	0.885	0.885	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.40	0.886	0.885	0.885	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.45	0.886	0.885	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.50	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.55	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.60	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.65	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.70	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.75	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.80	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.85	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.90	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
2.95	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
3.00	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
3.05	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
3.10	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
3.15	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
3.20	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893
∞	0.886	0.886	0.886	0.886	0.886	0.887	0.888	0.889	0.890	0.892	0.893

Table B.7: Table of $G_k(\alpha)$ (continued).

	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
0.10	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
0.15	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
0.20	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
0.25	0.249	0.249	0.249	0.249	0.249	0.250	0.250	0.250	0.250	0.250	0.250
0.30	0.298	0.298	0.298	0.299	0.299	0.299	0.299	0.299	0.299	0.299	0.300
0.35	0.346	0.347	0.347	0.347	0.348	0.348	0.348	0.348	0.349	0.349	0.349
0.40	0.394	0.394	0.395	0.396	0.396	0.396	0.397	0.397	0.397	0.398	0.398
0.45	0.440	0.441	0.442	0.443	0.443	0.444	0.445	0.445	0.446	0.446	0.446
0.50	0.485	0.486	0.487	0.489	0.490	0.490	0.491	0.492	0.493	0.493	0.494
0.55	0.528	0.530	0.531	0.533	0.534	0.535	0.537	0.538	0.539	0.539	0.540
0.60	0.570	0.572	0.574	0.575	0.577	0.579	0.580	0.582	0.583	0.584	0.585
0.65	0.609	0.611	0.614	0.616	0.618	0.620	0.622	0.623	0.625	0.627	0.628
0.70	0.645	0.648	0.651	0.654	0.656	0.659	0.661	0.663	0.665	0.667	0.669
0.75	0.680	0.683	0.686	0.689	0.692	0.695	0.697	0.700	0.702	0.704	0.706
0.80	0.711	0.715	0.718	0.722	0.725	0.728	0.731	0.734	0.736	0.739	0.741
0.85	0.739	0.744	0.747	0.751	0.755	0.758	0.761	0.764	0.767	0.770	0.773
0.90	0.765	0.769	0.774	0.777	0.781	0.785	0.788	0.791	0.795	0.798	0.801
0.95	0.788	0.792	0.796	0.801	0.804	0.808	0.812	0.815	0.818	0.822	0.825
1.00	0.808	0.812	0.816	0.820	0.824	0.828	0.832	0.835	0.839	0.842	0.845
1.05	0.825	0.829	0.833	0.837	0.841	0.845	0.849	0.852	0.855	0.858	0.861
1.10	0.839	0.843	0.847	0.851	0.855	0.859	0.862	0.866	0.869	0.872	0.875
1.15	0.851	0.855	0.859	0.863	0.866	0.870	0.873	0.876	0.879	0.882	0.885
1.20	0.861	0.865	0.868	0.872	0.875	0.878	0.881	0.884	0.887	0.890	0.892
1.25	0.869	0.872	0.876	0.879	0.882	0.885	0.888	0.890	0.893	0.895	0.897
1.30	0.875	0.878	0.882	0.884	0.887	0.890	0.892	0.895	0.897	0.899	0.901
1.35	0.880	0.883	0.886	0.888	0.891	0.893	0.896	0.898	0.900	0.902	0.903
1.40	0.884	0.886	0.889	0.891	0.894	0.896	0.898	0.900	0.901	0.903	0.905
1.45	0.887	0.889	0.891	0.893	0.895	0.897	0.899	0.901	0.902	0.904	0.906

Table B.7: Table of $G_k(\alpha)$ (continued).

	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
1.50	0.889	0.891	0.893	0.895	0.897	0.898	0.900	0.902	0.903	0.905	0.906
1.55	0.890	0.892	0.894	0.896	0.897	0.899	0.900	0.902	0.903	0.905	0.906
1.60	0.891	0.893	0.895	0.896	0.898	0.899	0.901	0.902	0.904	0.905	0.906
1.65	0.892	0.893	0.895	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
1.70	0.892	0.894	0.895	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
1.75	0.893	0.894	0.895	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
1.80	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
1.85	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
1.90	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
1.95	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.00	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.05	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.10	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.15	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.20	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.25	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.30	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.35	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.40	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.45	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.50	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.55	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.60	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.65	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.70	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.75	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.80	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.85	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.90	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
2.95	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
3.00	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
3.05	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
3.10	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
3.15	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
3.20	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906
∞	0.893	0.894	0.896	0.897	0.898	0.900	0.901	0.902	0.904	0.905	0.906

Appendix C

Selection criteria and questionnaire

The criteria used in the study for the selection of stations and data sets are given below in the original form. Footnote references in raised figures refer to the comments given in Section C.5.

C.1 Data requirements

The input necessary for the analysis is time series of wind speed, direction, cloud cover, and ceiling of clouds, covering a period of approximately 10 years. It is requested that each member state provide such data for a number of carefully selected stations of observation. The density of stations needed is one to four stations for each 250 × 250 square km, the best stations being selected from those available on the basis of the criteria listed below.

The success of the analysis depends critically upon the quality of wind data, which primarily requires that the immediate surroundings of the anemometer can be described as uniform for each of a few direction sectors (see below), and that no large orographic features are present within approximately 50-100 km[1)].

Experience shows that a proper evaluation of the quality of data from a particular station requires an interview of the personnel responsible for the local data collection and maintenance of instruments, preferably during a visit to the measuring site. Completion of the questionnaire reproduced in section C.3 below should be regarded as a minimum requirement for such an interview.

C.2 Selection criteria for wind-observation sites

- Unobstructed approach of the wind to the anemometer and well-located anemometer away from possible flow distortion near trees, buildings, or other structures. The site must be reasonably flat or gently rolling, thus avoiding local terrain-induced flow acceleration.
  In cases where it is impossible to avoid selecting stations where flow distortion or sheltering by nearby obstacles is suspected at the anemometer location, a detailed description of the anemometer location and surroundings is required (point 10 of the questionnaire). This will generally apply to anemometers located on top of buildings or within a distance of 30 building heights from large buildings.

- Out to 1-2 km the terrain should preferably be described (in each of 4-8 directional sectors) as homogeneous with regard to vegetation and land-use characteristics (i.e. roughness length) except that one[2)] well-defined change of these parameters is allowed to occur within this distance. In cases where a number of different surface characteristics are encountered, the quality of data for the analysis is degraded.

- At distances greater than 2 km the requirements for simplicity of terrain characteristics become less critical, except that large orographic features should not be present to distances of approximately 50 km. If flow conditions at the anemometer site are known to be influenced by nearby orographic features, the station should preferably be discarded[3)].

- Data should be collected consecutively at intervals of no more than three hours. Wind speed data should represent 10-min to one-hour averages.

- Suitably long records of the relevant parameters (see below) must be available, preferably covering 10 years or more. However, interruptions, e.g. due to instrumental failure, in otherwise good-quality data series may not be detrimental to the analysis.
  It is preferable that data be available for ten years within the period 1970-1981.

- Availability of cloud-cover observations together with the wind speed and direction data enabling the calculation of a stability index[4)].

C.3 Questionnaire for wind-observation sites

- Name of station
- Country
- Location (preferably latitude, longitude)
- Period of measurements (give time of start and end)
- Is the station equipped with automatic recording of average wind speed and direction? Describe instrumentation. If not, give a brief description of observational practice (e.g. read-out from strip chart, etc.)
- Further information regarding the station (e.g. change of observational practice or relocation of instruments during the period)
- Averaging period for wind speed (minutes)
- Sampling interval for each parameter (minutes)
- Height above ground of anemometer (metres)
- Description of anemometer location: If possible a series of photographs should be provided showing the meteorological mast and a number of overlapping pictures showing the surroundings as seen from near the mast looking in all directions. A sketch of the surroundings out to 2 km from the meteorological mast should also be provided showing with as much detail as possible major buildings, type of terrain (grass field, forest, etc.). For airports a convenient format is the ICAO landing chart. Out to 5 km dominant features should be noted. A map showing orographic details out to approximately 100 km should also be provided[5)].
- Further information regarding data, quality, or layout.

C.4 Layout for data sets

- Separate written description of the measuring site according to the questionnaire, including possible exposure correction factors.

- Magnetic tape(s) with time series in sequence of data from the selected stations with the following information:

Station No. (integer nnn)

Time as year, month, day, hour (in GMT) (integer: yymmddhh)

Wind speed in 0.1 $m\,s^{-1}$ (integer: uuu)

Direction in degrees (integer: DDD)

Temperature in 0.1° Celsius (integer: ±TTT)[6)]

Cloud cover in octas (integer: N)[6)]

Ceiling in 100-feet (integer: CCC)[6)]

Exposure correction factor (if available) in per cent (integer: EEE)[6)]

The data should preferably cover 10 years and in any case more than three years. Data should be given for every three hours and wind speed should preferably represent 10-min averages. Missing data should be indicated by filling the data field with *'s. Each record should have the following format:

yymmddhhuuuDDD±TTTNCCCEEE

The tapes should conform to the following specifications:

800 or 1600 bpi

9 tracks

odd parity

fixed record length (25 characters)

fixed block length

EBCDIC or ASCII code

C.5 Comments on selection criteria and questionnaire

Amendments and changes made to the selection criteria and questionnaire during the study are listed below. The main reasons for the amendments were the inclusion of stations in complicated terrain and change of models for the Wind Atlas analysis.

The first selection of stations for the study resulted in 50 stations which followed the criteria closely. In the second selection many stations did not meet all the requirements. Some were chosen for reasons of data coverage, others to illustrate wind statistics in complicated topography or to test the applicability and limits of the Wind Atlas methodology.

1) If large or nearby orographic features were present in the vicinity of the station, the station has been included as belonging to terrain types 3 to 5.
2) The change of roughness model was eventually able to calculate the effect of up to 10 roughness changes in each sector.
3) As under 1).
4) Cloud cover data were not used in the final model.
5) It was requested that the maps should be on the 1:25 000 or 1:50 000 scale.
6) The temperature, cloud cover, ceiling, and exposure correction factor were not used in the final model.

Appendix D

The data diskette

The main results of the Wind Atlas analysis – the regionally representative wind statistics for each station – are furnished on a floppy disk at the back of the Atlas. The diskette furthermore contains the wind speed data in the form of histograms. The diskette is divided into a number of subdirectories corresponding to the EC countries. The subdirectories are named as the country codes given below:

B	Belgium	I	Italy
DK	Denmark	L	Luxembourg
F	France	NL	Netherlands
D	Germany (FRG)	P	Portugal
GR	Greece	E	Spain
EI	Ireland	GB	United Kingdom

Radiosonde statistics for all the countries are in a separate subdirectory with the name RS.

The floppy disk is a standard double-sided, high-density (1.2 MB) diskette. It may be read by any IBM Personal Computer (PC, XT or AT) or true compatible with PC-DOS or MS-DOS operating system and a high-density disk drive.[†]

The Wind Atlas data are stored as sequential ASCII files with the file name extension LIB, and contain 48 lines/records of information. The contents of a file are shown schematically in Table D.1.

The raw data are stored as sequential ASCII files with the file name extension TAB. The contents of a histogram file are shown schematically in Table D.2.

[†]IBM PC, PC/XT and PC/AT, and PC-DOS are trademarks of International Business Machines, Inc. MS-DOS is a registered trademark of Microsoft, Inc.

Table D.1: Contents of a Wind Atlas file. The Weibull A- and k-parameters are given for four roughness classes and five heights in each of the twelve sectors as well as for the total distribution.

Line	Contents
1	Character string identifying the file/station
2	Number of roughness classes, heights and sectors: 4 5 12
3	The standard roughness lengths: 0.0002, 0.03, 0.1 and 0.4 [m]
4	The standard heights above ground level: 10, 25, 50, 100, 200 [m] a.g.l.
5	The frequencies of occurrence for **roughness class 0**
6	Weibull A parameters for 10 m [m s^{-1}]
7	Weibull k parameters for 10 m
8-9	Weibull A and k parameters for 25 m
10-11	Weibull A and k parameters for 50 m
12-13	Weibull A and k parameters for 100 m
14-15	Weibull A and k parameters for 200 m
16-26	As line 5-15, but for **roughness class 1**
27-37	As line 5-15, but for **roughness class 2**
38-48	As line 5-15, but for **roughness class 3**

Table D.2: Contents of a histogram file.

Line	Contents
1	Character string identifying the histogram file
2	Latitude, longitude, and anemometer height
3	Number of sectors, scaling factor for wind speed, and offset for direction
4	Frequencies of occurrence in per cent of the wind in the different sectors
5–	Line 5 and onward contains the climatological table, each line corresponding to one wind speed class. First, the upper limit of the speed class is given, then follow the frequencies of occurrence of this class in the sectors and in total. A maximum of 50 wind speed classes may be specified. The frequencies are normalized sectorwise.